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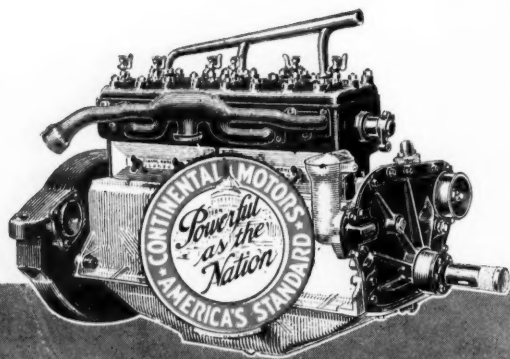
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NEW YORK—THURSDAY, OCTOBER 12, 1922

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Paris Automobile Show Largest Ever Held in France

One tendency is toward slight increase in price. Several concerns announce smaller models. Lighter reciprocating parts, especially aluminum pistons, now employed. Four-wheel brakes are extensively used. Rolls-Royce to produce a 20 hp. six

By W. F. Bradley

PARIS, FRANCE, Oct. 6, 1922.

WITH 1050 stand holders the Seventeenth Paris Automobile Show was opened yesterday by Minister of Commerce Dier in the Grande Palais here. This is the largest automobile show that has ever been held in France. It has been necessary to erect temporary buildings with a floor space of 140,000 sq. ft. in order to take care of all those desiring space. These additional buildings have been erected on the Esplanade Invalides near the main show building. Trucks, bicycles and automobiles with a piston displacement of less than 67 cu. in. are located in this annex.

President Millerand, accompanied by leading members of the government, made a formal visit to the show. The salon is representative of the entire continental automobile industry, but there are only three British firms represented, while the American exhibitors are but six in number. American firms are working at a great disadvantage in seeking business because of the exchange situation and the high import duty on American automotive products. Ford, with a stronger position in the French market than any other American firm, has not thought it worth while to apply for space in the shows.

A slight tendency toward increased prices is in evidence, although practically no price changes of im-

portance have been announced. The trend toward slightly higher prices is due to a combination of three factors.

- 1—Increased raw material costs.
- 2—Slightly increased labor rates.
- 3—Lack of foreign competition with the exception of Italian.

French manufacturers seem to be unaware of the fact that America has lowered her automotive import duties.

Coincident with the opening of the show came the announcement of a new Rolls-Royce 20 hp. six-cylinder model with an engine of 76 mm. bore and 115 mm. stroke. The chassis is not on exhibit, but it is stated that the engine will be a valve-in-head type with detachable head and with camshaft in the crankcase. Engine and gearset are to be joined to form a unit powerplant. Battery ignition will be employed. Semi-elliptic springs will be used both in front and in rear. This marks a distinct change from former Rolls-Royce practice in which cantilever springs were used on the rear. This new chassis is not to be shown here or at the London Show. It will sell in London for £1,100.

The announcement by Rolls-Royce of this smaller model is quite typical of a general trend that is evi-

dent throughout the Paris show this year. There are but few companies which do not now market a smaller model than ever before. Lorraine-Dietrich, Renault, Hotchkiss, Lancia and Itala, among others, are all showing smaller models which are characteristic of this general trend. Hispano-Suiza is about the only important manufacturer who is still concentrating on a single large model in the higher price class. The new Lancia car, with its radical design combining the body and frame, is one of the chief features of the show. A complete description of this interesting car appears on other pages of this issue of AUTOMOTIVE INDUSTRIES.

Decrease in Engine Size

The show this year embodies many points worthy of close engineering study. Its most pronounced tendencies are a decrease in engine size, high rotative speed made possible by lighter reciprocating parts including, in particular, the extensive use of aluminum pistons. Some magnesium pistons are in evidence. There is a great increase in the number of overhead valve engines being used in sport cars. The progress made by battery ignition last year has been arrested, magneto ignition having recovered some lost ground.

Four-cylinder engines dominate the show. The Fiat is the only twelve-cylinder model exhibited. There are no new eight-cylinder jobs shown and there is very little production on the eights already in existence. Some gains have been made by the six-cylinder engines, but they have been of little importance and have been confined to engines in which the piston displacement is 122 cu. in. or less.

Four-wheel brakes are being used far more extensively than ever before. The Perrot system alone is used on thirty-five makes. The Adex system is used by three firms, while the Isotta Fraschini and similar types are employed on about a dozen different cars. In addition to these, there are about twenty individual types of front brakes now applied by conservative firms of high reputation, such as Unic, De Dion, Delaunay-Belleville, Hotchkiss and Renault. Front wheel brakes are also found on small cars with a piston displacement as low as 91 cu. in.

In addition to the large number of firms now using four-wheel brakes as standard equipment, many others announce them as optional equipment. When front brakes are fitted they are usually operated by the foot. Hand brakes operating on the propeller shaft are still used, but in many cases have been abandoned altogether. There is some tendency to do away with rear wheel brakes. This practice is the result of racing experience and has been followed by Chenard & Walcker and Bignan. These firms have Hallot type servo transmission brakes and a pair of brakes on the front wheels.

The hydraulic brake system has not made any progress. It is used only by Rolland-Pilain and Bugatti. The use of the servo mechanism is increasing. It is now being employed by Ballot, Hispano-Suiza, Fiat and Renault, beside others mentioned above.

Considerable attention has been given this year to changes in the construction of the rear spring suspension. No single type predominates but the cantilever and semi-elliptic types are strongly in evidence and about equally divided. The objection brought against cars equipped with the cantilever type of springs is that they do not hold the road at high speeds as well as cars with other types of springs.

Several unconventional spring suspension types have made their appearance, one of these being the De Ram system, a combined hydraulic and coil spring used on the

Bignan. This is somewhat similar to the type of front springs on the Lancia frameless chassis. The practice of building shock absorbers as an integral part of the chassis is becoming more pronounced.

Poppet valve engines dominate the field, although Panhard has continued its sleeve valve engine and has dropped all poppet valve models. Mors, Minerva and Voisin also continue to use sleeve valve engines. Peugeot has added one sleeve valve type and is also preparing to market the special two-stroke cycle semi-Diesel type engine for passenger car work. This engine, described some time ago in AUTOMOTIVE INDUSTRIES, has been used, up to the present time, only in trucks and in stationary work.

Bignan has placed on the market this year a valve gear which positively opens and closes the valves. This design was used with much success last season in racing cars of the same make.

The great demand for economy in operation has been responsible for considerable work in connection with high speed engines of the overhead valve type with small piston displacement. Speeds of 3000 r.p.m. for normal type engines are quite common.

Sixty-seven per cent of all the cars made by Continental manufacturers are fitted with aluminum pistons. Bignan and Voisin announce the use of magnesium pistons on their sporting type engines. In developing valve-in-head engines Continental designers have favored the location of the camshaft in the crankcase. This construction appears in a majority of cases. The overhead type of camshaft generally is used on the more expensive cars, although there are some exceptions. Fiat, for instance, has produced a high grade six-cylinder valve-in-head engine with the camshaft in the crankcase.

In this case the timing gear chain is located in the rear and all engine accessories, including the carburetor, are carried between the crankcase supports and are hidden by detachable covers.

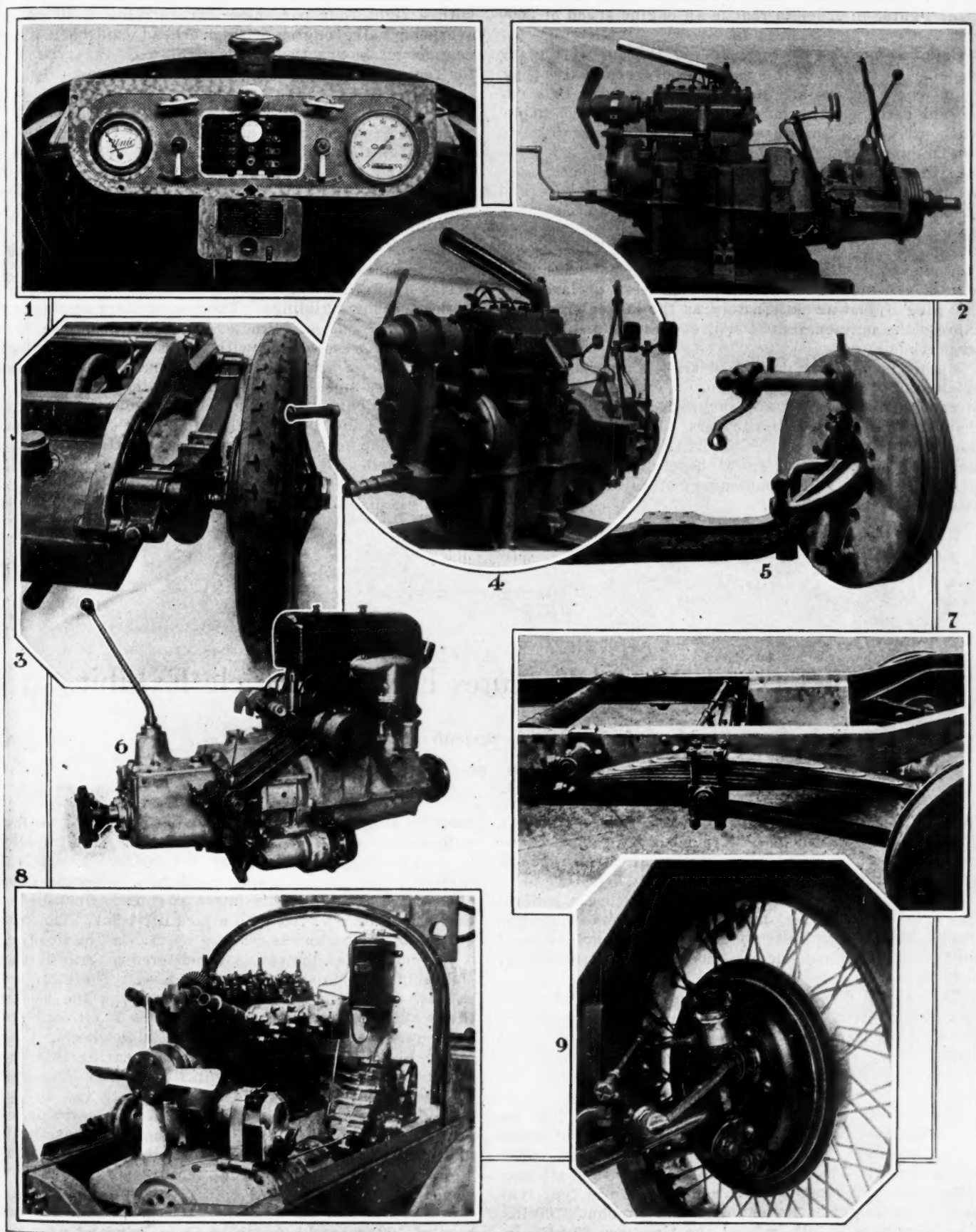
DeDion-Bouton has adopted overhead valves for both its 12 and 10-hp. models. Both of these jobs are fitted with Perrot front wheel brakes. Delaunay-Belleville is showing a new type 80 x 150 mm. overhead valve engine with overhead camshaft and detachable head. This model is also fitted with Perrot front brakes.

Hotchkiss has a small four-cylinder model with an L-head engine of 80 mm. bore and 120 mm. stroke. A return has been made to the Hotchkiss drive on this new chassis. This is a medium-sized car capable of making 65 m.p.h. It is now equipped with Hotchkiss type front brakes which were formerly used only on the Hotchkiss big six.

Renault Adds Small Model

Small two- and three-seated models with a 96-in. wheelbase have been added to the Renault line. This new chassis is equipped with a four-cylinder engine of 50 mm. bore and 90 mm. stroke. This car is in the same general class as the one produced by Citroen about a year ago and will come into direct competition with the Citroen model. Its mechanical features are similar to those of the four-passenger 10-hp. Renault which is being made on a big production basis. The only essential difference is in the use of a detachable head.

Renault has adopted diagonal cantilever springs on all cars above 10 hp. The radiator formerly in back of the engine is now placed in such a position as to form a continuation of the hood on each side of the car, thus changing completely the external appearance. The Citroen line remains unchanged except for details, but a sport model has been added. This is fitted with alum-



1—Switches centered on instrument board of the new Unic. 2—Side view of 10-hp. Unic engine. 3—Delaunay-Belleville; Houdaille shock absorber mounted under spring pad. 4—10-hp. Unic, unit construction engine and gearset. 5—Front wheel brakes recently adopted on the 12-hp. Delaunay-Belleville. 6—Chenard-Walcker four-cylinder, overhead valve engine. 7—Unic cantilever spring and three leaf, $\frac{1}{4}$ elliptic spring which is neutral under normal load. 8—Overhead valve engine of new 12-hp. Delaunay-Belleville. 9—Detail of front wheel brakes on new 10-hp. Unic

inum pistons and the other reciprocating parts are also made lighter in order to realize an engine speed of 3000 r.p.m.

Ballot is now ready to market a 122 cu. in. touring model. The engine of this car is an overhead valve type. Four wheel brakes are standard equipment. This car is said to be capable of making a speed of 65 m.p.h. when carrying a four-passenger body and is reported to run 20 miles per gallon of gasoline.

Mathis has produced two small sixes, one with overhead valves, the other with side valves. The bore and stroke of the overhead valve model are 60 and 70 m.m., respectively, while the side valve model is 55 x 80 m.m. These are the smallest sixes in the show. Because of their small size they are fitted with the new Bosch 12 m.m. spark plugs. The Mathis engineers declare that this plug is just as satisfactory as the larger sizes, and express the opinion that it will eventually displace the large models.

Mathis is using on the small sixes a rear axle made of aluminum silicon alloy. Another example of the use of cast aluminum alloy housing with steel tube liner is that employed on the Bignan cars. Rear axle construction, however, in general, is tending towards the pressed steel welded type with spiral bevel gears. All other types of final drive for passenger cars are going out of existence.

The Salmson Aviation Co. has come into the market with a light four passenger car carrying a 70 cu. in. overhead valve engine with overhead camshaft. This new model is practically identical with the type used for racing purposes during the last two years.

Talbot-Darracq Adopts Magneto

Only a few firms have abandoned American makes of battery ignition but at the same time some European battery and generator systems have come to the front. Talbot-Darracq, one of the first companies to use battery ignition on its popular 10 hp. model, has abandoned this system in favor of the magneto. There is considerable use of the new Scintilla generator and magneto combined in one unit.

There is an important display of small two-seated cars in the overflow buildings. These cars carry engines not exceeding 67 cu. in. Practically all of them are four-cylinder water cooled jobs with the exception of the four-cylinder Sara, which is air cooled. A number of big manufacturers are much interested in this diminutive car.

Renault, Peugeot, Citroen and Salmson are the chief exhibitors in the commercial vehicle section. Buses and rail cars have been given a great deal of attention. Truck business generally has been dull, however, except in the field of light delivery vehicles. Renault is showing a 19-ton gasoline locomotive for use on normal gage tracks.

New Taxicab Model Features Electric Vehicle Exhibit

*Rauch & Lang electric taxicab and Kelland truck
shown for first time at Electrical Exposition*

A NEW electric taxicab, two new electric truck models, and a new Philadelphia storage battery, comprised the chief features of automotive interest at the New York Electrical and Industrial Exposition, Oct. 7 to Oct. 14.

Propaganda for the use of electric vehicles in general was in evidence in every exhibit. The makers of electric trucks, especially, seem to have come together very solidly behind a movement to boost the electric vehicle in general.

The vehicle displays were not extensive, nor did any special merchandising effort appear in most instances. The vehicles were simply there for anyone who cared to look at them. Active salesmanship was evident in one or two instances, but was the exception rather than the rule.

The new Rauch & Lang electric taxicab, exhibited for the first time at this show, embodies a number of interesting features. The motor is hung at about the center of the frame. The drive is through a short shaft provided with universals at each end to a worm type rear axle. The weight of the cab complete is about 3700 lbs. The wheelbase is 102 in. and the tires are 32x4½ in. pneumatic. The springs are semi-elliptic, front and rear. Dot chassis lubrication is provided.

The battery is rated at 178 ampere hours capacity, and it is said that the cab will make sixty miles on one charge under ordinary conditions of city driving. The installation of the battery is such that it is easily re-

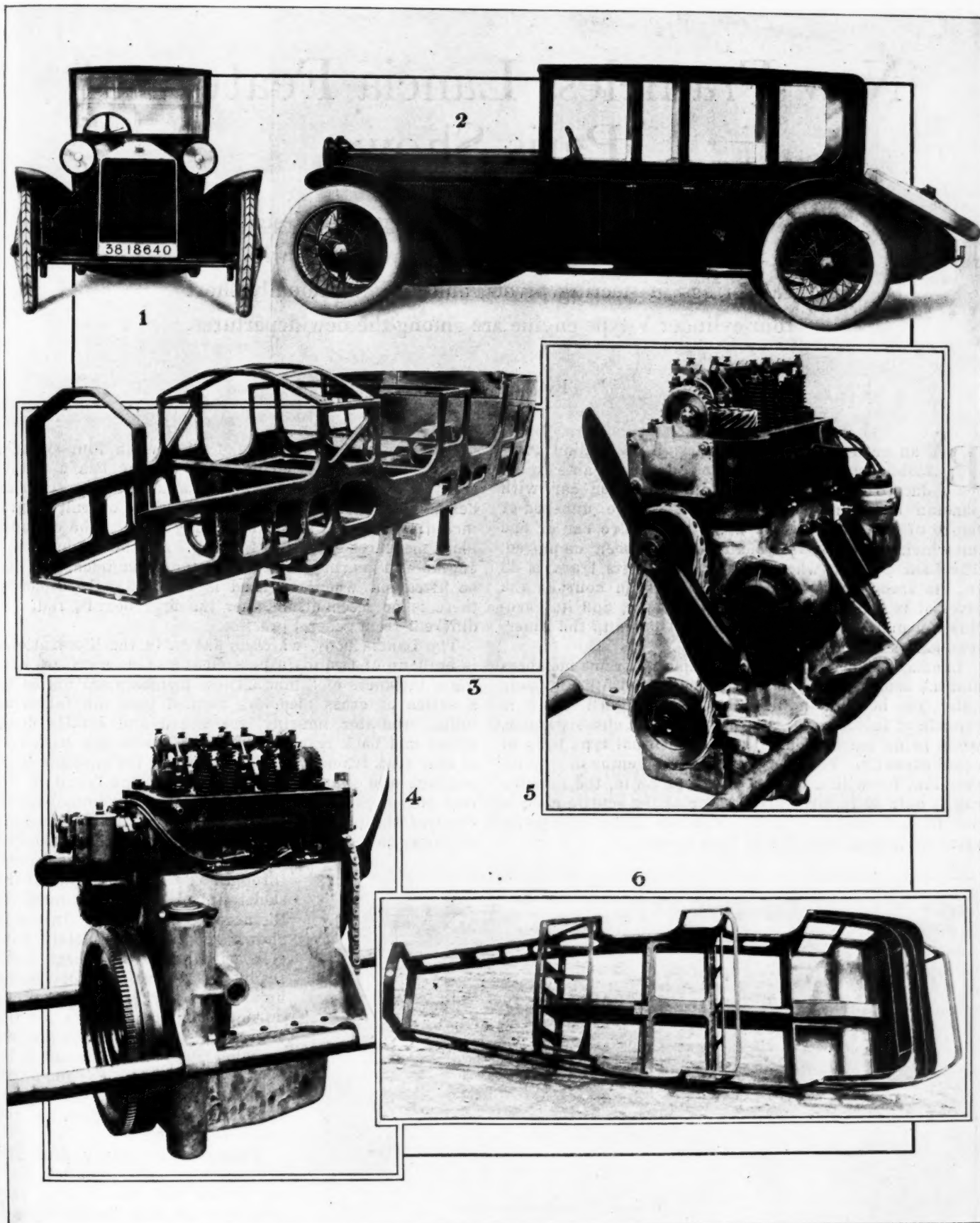
moved. It is intended that two batteries will be used with each cab, one battery being charged while the other is in service. Two-thirds of the battery capacity is carried under the hood and one-third in a compartment over the rear axle. The latter portion is installed so that it may be removed with a jack lift truck. The front portion of the battery is reached by raising the hood.

The interior of the cab is upholstered in gray leather. Dull aluminum finishing strips are used. The large rear window drops down into a compartment in the back of the seat. Regular equipment includes front and rear bumpers, side lights, headlights, and disk wheels.

The Kelland is an electric truck appearing this year for the first time. A double reduction straight line drive is used, and the chassis is equipped with two brakes, both operating on the rear wheels. The carrying capacity of this new job is ¾-1 ton. The wheel base is 102 in. and the overall length with standard body is 13 ft. 4 in. No radical or unusual features of design have been incorporated.

Milburn is showing a new electric truck with a wheelbase of 102 in. and a width of 52 in. Special provision has been made for quick exchange of batteries. Batteries are mounted in standardized trays which roll in and out on tracks. Installation is half under hood and half under seat. Unit powerplant construction is used.

Other vehicle exhibitors included R & L passenger cars, Walker, Steinmetz, Ward and C-T trucks.



1—Front view of new Lancia with sedan body. 2—Side view of sedan body showing high interior height and low overall height with good clearance. 3—Combined touring car body and chassis. The frame is covered with thin sheet steel. 4—Lancia 122 cu. in. engine. Carburetor and exhaust manifold are at rear of cylinder block. There is a small angle between the two sets of cylinders. 5—Left side of engine. Single line drive for water pump, electric generator and distributor. A semi-circular hanger carries engine on two steel tubes. 6—Touring car skeleton body showing radiator frame, engine housing, front and rear seats, well to receive top and rear locker for spare wheels

New Frameless Lancia Feature of Paris Show

Body made from sheet metal stampings is so designed as to require no chassis frame. Novel front axle, with helical springs in steering pivots, and an exceptionally short four-cylinder V-type engine are among the new departures.

By W. F. Bradley

BY an entirely new type of design the Italian automobile manufacturer Lancia has been able to reduce the weight of a four-passenger car with phaeton body and full equipment to the unheard-of figure of 1650 lb. This is not a diminutive car or one on which metal paring methods have been employed. The Lancia has a wheelbase of 122 in., its track is 43 in., its speed ability is 70 to 75 miles an hour on the level, it is fitted with front wheel brakes; and its gasoline consumption is declared to be 21 miles to the American gallon.

Lancia has saved weight by abolishing frame members and the usual type of body construction with heavy body sills. The body of the new car is so designed that it is capable of fulfilling all the functions of a chassis frame, while being much lighter than any normal type body of equal capacity. The design brings the center of gravity very low, for with a road clearance of 7.8 in. the radiator cap is only 40 in. high and the top of the scuttle dash is but 43 in. from the ground. The low center of gravity gives exceptional stability at high speeds.

Other features are the use of a 122 cu. in. four-cylinder V-engine developing 50 hp. The engine has a crankshaft with three main bearings and it has a separate bearing for each connecting rod, and an overall length, including flywheel and fan, of only 22 in. The cylinder block measures only 16½ in. long. All the mechanism—engine and gearbox—is carried under the hood, and can be lifted out when the hood is removed. Consequently there is no mechanism under the floor boards, radically different from general practice.

The Lancia body, which is shown in the illustrations, is built up of two main pressed steel side members having a thickness of 2 mm. These members are united by a series of cross members formed into the following units: radiator housing, toe board and scuttle dash, frame and back rest of front seat, frame and back rest of rear seat, frame work of rear locker for gasoline tank, baggage and spare wheels. From the toe board to the rear seat back rest there is a longitudinal tunnel which receives the propeller shaft. The top of the tunnel is cut away just ahead of the front seat for the brake and change speed levers to be passed through. Two photographs of the skeleton body are reproduced in the accompanying cuts. In one is shown the body completely paneled with thin sheet steel, ready to receive the detachable upholstery. These illustrations do not show the carriers for the engine and gearbox, which are two parallel steel tubes secured by means of flanges to the toe-board frame and to the front cross member forming the bottom of the radiator housing.

When the necessary dies and presses have been installed, Lancia claims that this type of construction is very much cheaper than normal body building with its attendant chassis frame. The workmanship throughout follows the usual high-class Lancia standard, but the new car can be put on the market cheaper than other European cars of normal design and equal finish and ca-

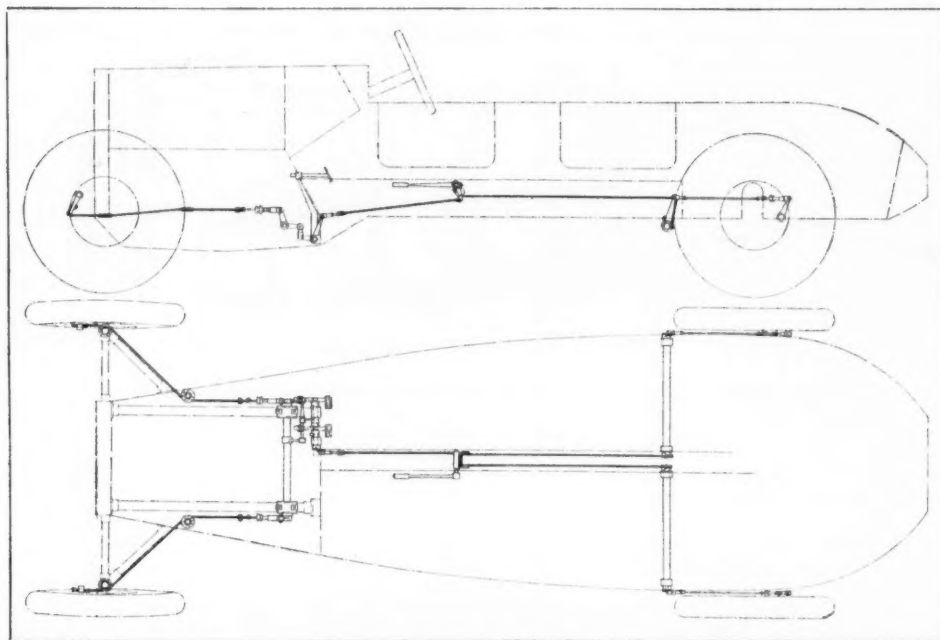
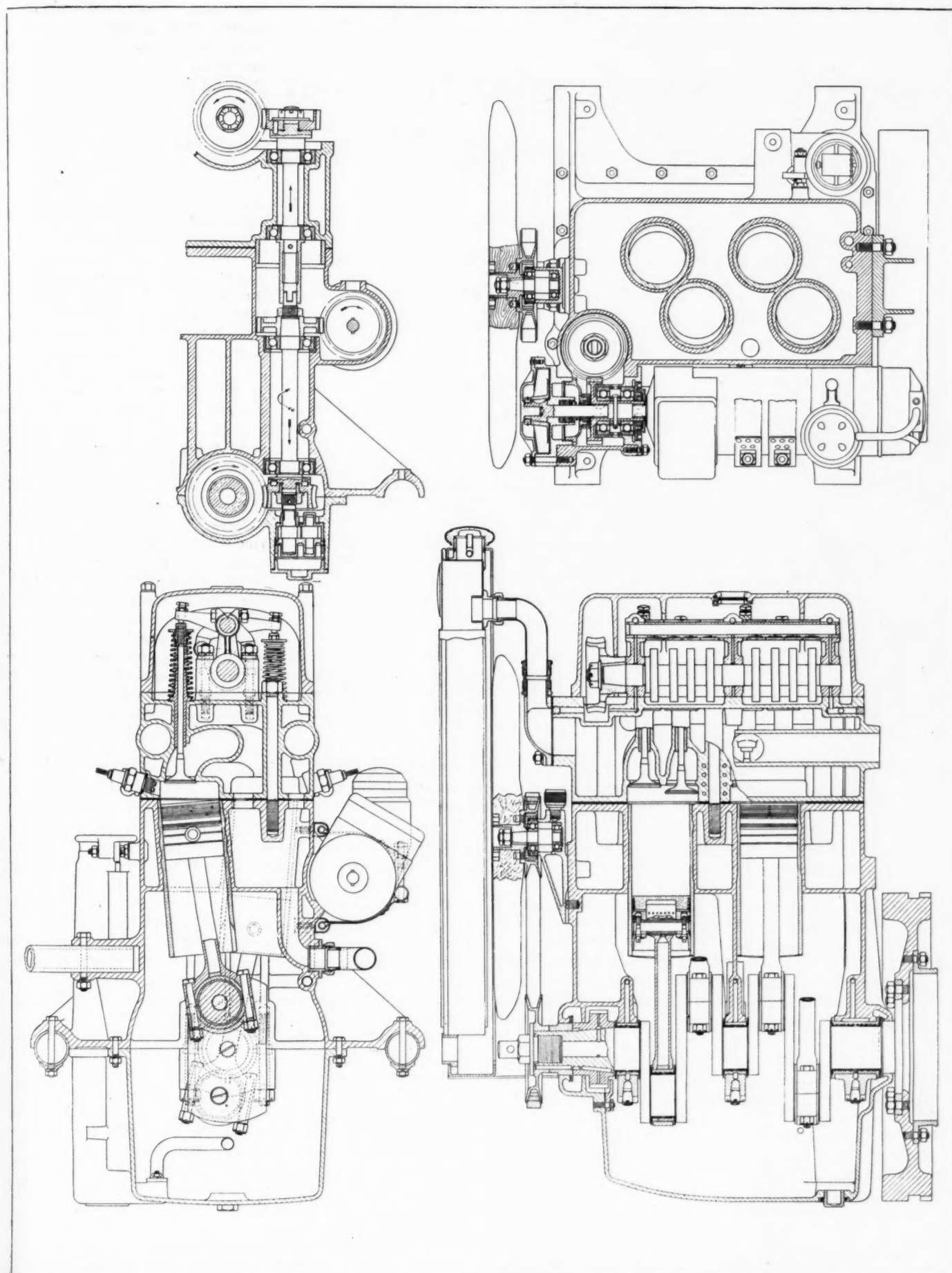
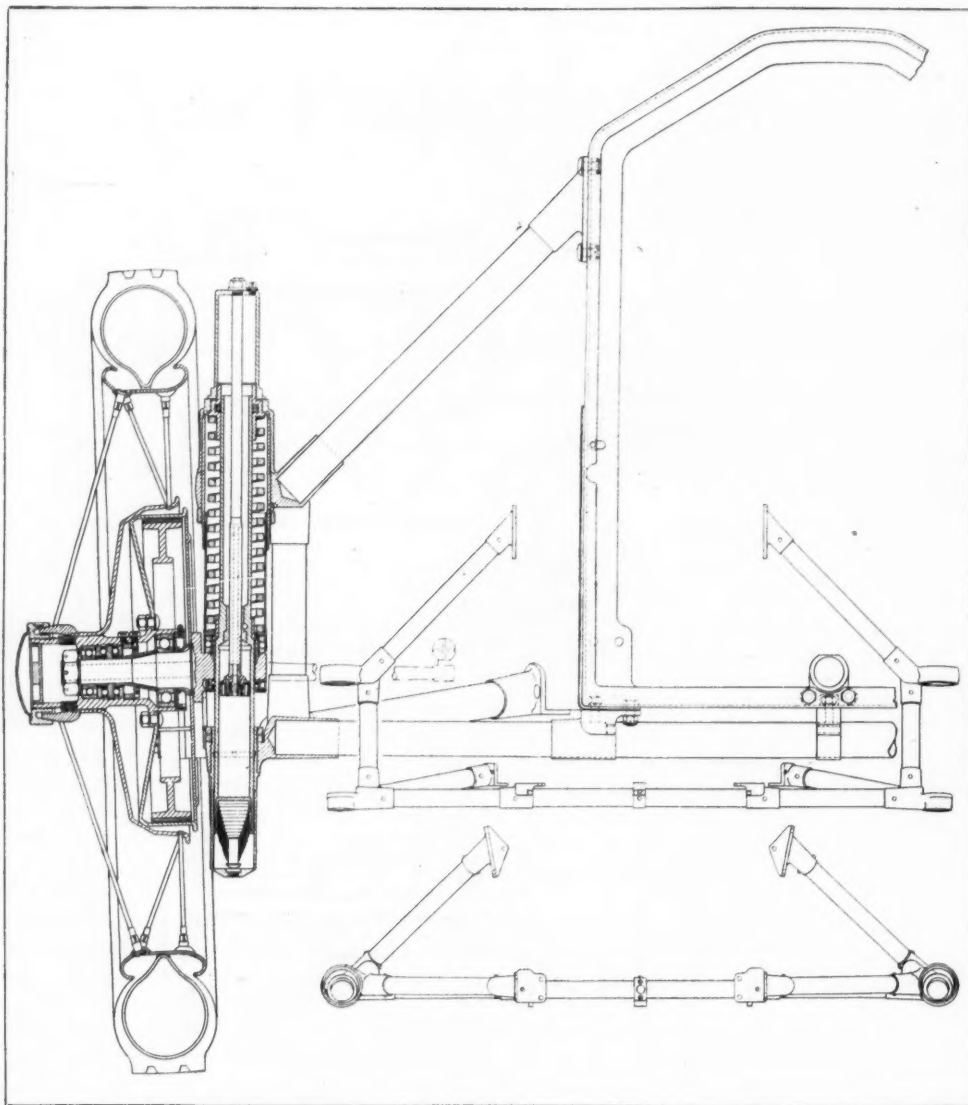


Diagram showing brake control on the new Lancia. Front wheel brakes operate in conjunction with the rear wheel brakes



Sectional drawings of the Lancia 122 cu. in., four-cylinder overhead valve V-type engine. In addition to forming a V of 20 deg. the cylinders are staggered, thus avoiding use of forked connecting rods and giving separate bearing for each rod. The overall length of the engine including flywheel and fan is only 22 in.



Lancia triangular steel tube construction in place of usual front axle. Enclosed coil springs and hydraulic shock absorbers serve for front suspension

capacity. It is intended to build this car in America under license, negotiations for the sale of these rights being under way at the present moment.

The engine used on this new Lancia is a four-cylinder V-type with an angle of 20 deg., a 2.9 in. bore and 4.7-in. stroke. This arrangement of cylinders is covered by patents and is a type which has been in production for two years on the 8-cylinder Lancia. In addition to forming a V, the Lancia cylinders are in staggered relation. This disposition avoids the use of forked connecting rods and gives a separate bearing for each rod, as in conventional construction. The crankshaft, which has a diameter of 2.1 in., is very short and is carried in three plain bearings, the lengths being 1.29, 1.29 and 2.55 in., respectively. Circular webs are used on the crankshaft.

Cylinder barrels are of close-grained grey iron, cast separately with a flange on the head. After receiving a first machining operation the barrels are set in the mold and have the aluminum water jacket and crankcase cast around them. A detachable cast iron cylinder head is used. The vertical valves have an external diameter of 1.6 in., and are operated by an overhead camshaft and rockers. The drive is through a vertical shaft and spiral gearing, the shaft being in the forward portion of the cylinder casting. The valves are closed by pairs of concentric springs. The connecting rods are tubular with white metal split bearings held in the usual manner by

two bolts. The aluminum alloy pistons have considerable metal in the head, very thin skirts, and are fitted with three steel compression rings having a depth of only 2 mm. Below the compression rings there are two scraper rings. The wrist pin is fixed in the piston and turns in the rod.

On the left side of the engine there is a neat arrangement of water pump and combined Bosch generator and distributor. Only the oil filler and breather are placed on the right-hand side of the engine. A wood airplane type propeller is driven by belt from a pulley on the crankshaft. The position of the Zenith carburetor is unusual. It is bolted up direct to the rear face of the cylinder head, between the two exhaust ports. As shown in the illustration, the exhaust manifold is swept to the left and then carried to the rear in the normal manner.

Back of the engine, but carried on the same pair of steel tubes, is a three-speed gear box. Since all the gearset is under the hood forward of the dash, the change speed selector mechanism has to be carried rearwards to the opening in the central tunnel through which passes the control lever. A normal type of rear axle with differential and Gleason spiral bevel gears is used, together with semi-elliptic springs attached to the frame body at their front end in the usual manner and shackled at the rear to a

steel tube. Hotchkiss drive is employed. There is a transverse recess for the rear axle. When the car is loaded the floor boards are on the same plane as the drive shaft.

The front end of the car is quite distinctive, for instead of the usual type of forged axle Lancia has a triangular steel tube construction comprising a bottom horizontal tube uniting the radiator housing and the steering yokes, two tubes from the top of the steering yokes to the top of the radiator housing, and another pair from the bottom of the steering yokes to a point on the main frame on a line with the dash. Front suspension is by means of a system of enclosed coil springs and hydraulic shock absorbers, the cylinders for the hydraulic system serving also to house the coil springs, as shown clearly in the drawing. The front wheel brakes are operated by pedal in conjunction with those on the rear wheels. A feature of the front wheel brakes is that the drums are within the wheels, the center line of the drums almost coinciding with the center line of the tire. Aluminum drums with die cast aluminum shoes are employed.

Two body styles have been decided on, a phaeton and a sedan, the latter being a superstructure on the phaeton. For the open body there is a disappearing top. Back of this is a rear compartment within which is housed the gasoline tank and a passenger's trunk supplied with the car. On the hinged rear panel giving access to the compartment there is a carrier for two spare wheels.

Common Sense and Compromise Needed in Solving Highway Problems

Honest differences of opinion frequently arise in connection with road building and maintenance policies. Education will accomplish more than merely calling names. All highways need not be high priced. Cheaper construction better in some cases.

By James Dalton

HIGHWAY legislation has "as many sides as a circle," but there is one spoke in the wheel to which representatives of the automotive industry can cling with reasonable assurance that it won't snap. That spoke is labelled "Common Sense." In this case common sense means a spirit of fair play and compromise. Motor interests have been buffeted about in legislative halls until they feel badly battered and they will gain nothing by making a noise like a worm. Neither will they gain by arming themselves with bludgeons and trying to beat up their opponents.

Legislative controversies in which diametrically opposite views are presented must be settled by compromise if the breach is to be bridged. There must be a spirit of accommodation in all human relations if differences are to be adjusted amicably.

There probably is no phase of legislation concerning which there are more honest differences of opinion than that relating to highways. The impression has been given far too often that representatives of the automotive industry seek only to serve selfish interests in their advocacy of good roads. Not enough emphasis and clarity has been given to the fact that society as a whole and taxpayers in general profit equally with motor vehicle drivers from every mile of improved highway.

It must not be forgotten that there has been an insidious, insistent and plausible propaganda designed to convince the public that taxpayers are the goats and motor vehicle operators the sole beneficiaries from good roads. It is not necessary to refer to the authors of this propaganda. A good many of them are interested in another form of transportation.

Sound economics and deep study have resulted in the evolution of the theory that the original expense of highway construction should be met by bond issues and that motor vehicle fees should be used to pay maintenance costs but this proposal needs a lot of selling before it will be accepted universally. In the meantime automotive interests must demonstrate that they are perfectly willing to pay fair fees for the use they make of the highways.

The highway problem is fundamental so far as motor vehicles are concerned and it must be solved in whatever way will be most beneficial to the greatest number

of people. It should not be considered exclusively from the viewpoint of the automobile owner or the railroad owner.

Motor vehicle users should not object to the payment of a reasonable sum for the use of the roads and the vast majority of them don't. When excessive imposts are proposed, the chance of holding them within fair limits will be better if the problem is attacked in a spirit of compromise. Gun toting and blackjack brandishing are spectacular but they seldom bring as satisfactory results in the end as a give and take argument based on a common-sense acceptance of the old adage that there always are two sides to a story.

It is far more profitable and pacific to meet the other fellow's arguments than it is to yield to the temptation to call him a bone head. It's time enough to fight when it is found that there is a stubborn determination to swat the motorist. When this has been demonstrated the time has come to fight and fight hard with any weapon recognized in civilized legislative warfare.

When it comes to the question of highway building and who shall pay the bill, one of the keenest students of the subject within the industry has said:

"The most important problem before those who are interested in highways is the question of finance.

"The roads will be paid for by the taxpayer, but if the public, who is both taxpayer and user, realizing the advantages of highway transport, decides to build highways that are open to all users, it is, in effect, really building roads for its own use.

"If we are to ask the public for money to build roads to promote highway transport, we shall make a big mistake if we do not build properly.

"Obviously the road must justify itself as to cost. It is as big a mistake to build too well where the traffic does not justify, as not to build well enough. If such mistakes are made, money will be thrown away and the public, who may not analyze the problem thoroughly, will say: 'This highway thing is no good. We have spent a lot of money for roads that have been ruined and what's the use?' If such a state of mind is created, it would take years to overcome the prejudice.

"The railroads in their early days built cheaply, without regard to the requirements of traffic and with-

out regard to the future, with the results that the roads had to be rebuilt. We cannot afford to make the same mistake with highways and highway transport. The public will willingly furnish money to build roads that are justified by the traffic, whether for motor truck, motor bus or passenger car, and they should not be asked for more. When I say the public, I mean the taxpayers.

"As a rule, when one speaks of improved highways, the average man thinks of a very heavy concrete road built at a tremendous expense. Such roads are not needed everywhere. It is highly important that we have a system of primary roads which will carry the heavy traffic in congested districts, but they should be built only after careful analysis has been made to determine whether the traffic will justify the expenditure.

"We also need a system of secondary roads that will be hard surfaced, but not particularly heavy, in order to meet the needs of local traffic conditions. There is, of course, a tremendous volume of traffic on these secondary roads, but the unit is light and the distance short. If the highway problem is approached in this way we can develop a satisfactory and completely efficient system of highways.

"I believe that the construction cost of primary roads should be borne by the Federal and State governments and that the funds contributed by the States should be provided by bond issues.

"If the taxpayers approve of bond issues with which to build roads, they have a perfect right to insist that these roads shall for all time be properly maintained.

They will not approve future bond issues if, because of lack of maintenance, the roads are destroyed long before the first bonds are destroyed.

"The State should expend the fees assessed against motor vehicles for maintenance purposes and the money should be fairly apportioned to maintain primary, secondary and all other roads, but no part of it should be spent for new construction. My definition of maintenance is to do such repair work as may be necessary to keep the road always in as good condition as when it was built."

Here is a sound, sane, logical and economic theory for highway construction and maintenance. If the automotive industry can educate the taxpayers of the United States to an understanding of the fact that the term "good road" does not always mean concrete or something equally expensive but may mean sand or gravel, it will have done a great service to itself and the public generally.

Legislators need as much education, generally speaking, as do other taxpayers. If all state law-making bodies could be given a clear conception of this highway program, which has been accepted as sound by the leading advocates of good roads, it is probable there would be much less opposition to bond issues.

The principles laid down may have to be modified somewhat to meet local or state conditions, but they can be accepted as fundamentally sound.

Reports Show Bus Transportation Gaining the World Over

BUS passenger transportation in the Damascus region (Syria) has increased very much in importance during the past six months. The Beirut-Damascus railroad, was up to a short time ago charging three Syrian pounds (\$5) for a third-class railway ticket to Beirut (86 miles by rail), and as the same trip could be made in about half the time in an auto bus for \$3.30, the business of the railway company fell off alarmingly and did not improve when the price of a third-class ticket was decreased to \$3.45. As a result the railway company inaugurated a motor bus service of its own, the price of a ticket on which is \$2.05.

Reports from London, Ont., state that the fares charged by the street railways there until the spring of 1922 were regarded the lowest in Canada and in the United States. Last spring the fares were raised, but this increase did not result in any profit to the street railway companies because of the operations of motor buses, which began at about that time.

The bus rates are somewhat lower than those of the street railways although the former are obliged to pay the city a license fee of \$100 for each bus. They furthermore are compelled to take out a liability insurance to cover payment of damages for injuries to persons or property.

Consul Haskall reports that Geneva is the first Swiss city to carry extensive plans for the adoption of auto buses. A company has been formed for the purpose of operating three lines, the concession for which, it is anticipated, will be granted shortly. The cars for the new bus lines will be similar to those in use in Paris, only somewhat smaller, with a total capacity, including

that of the rear platform, of thirty-five passengers. The buses, which will be equipped with pneumatic tires, will be furnished by the Sauer Company of Arbon.

The introduction of bus lines is apparently not so much in response to a need for more extensive transportation facilities, but rather a venture in underselling the trolley lines, fifteen of which constitute the present system, embracing a length of 119 kilometers. The rates announced by the bus company are appreciably lower than those of the trolleys.

The conversion of taxicabs into buses in Aden, Arabia, is an unusual development caused by a ruling recently passed compelling taxi drivers to assemble their cars in certain prescribed taxi stations, and to wait there for passengers, leaving in order of priority instead of running up and down the streets soliciting business as has been their custom heretofore. To make matters worse for taxi drivers there were several automobile trucks following a more or less fixed schedule and route to which the above ruling does not apply. These buses carry three to four times as many passengers at about one-half the rate of the taxis and are very popular.

After an unsuccessful appeal to the authorities taxicab drivers started about one month ago to change their cars into buses, of which there are now six in running order and several more in the course of construction. The bodies to fit the buses are made locally and at a comparatively low price.

Owing to the congested condition of traffic in the central sections of the city of Melbourne, Australia, it has been proposed that motor buses, similar to those used in London, be put in service at the earliest possible moment.

New Electric Transmission Provides for Direct Drive

Sperry transmission has five speeds forward, two in reverse and electric braking. Direct drive obtained by automatic, electrically operated friction clutch. Generator fields receive momentary excitation from battery to avoid lag in operation.

AN electric transmission, which provides direct drive in fourth speed, has been developed by Elmer A. Sperry, president of the Sperry Gyroscope Co. It gives five speeds forward, two in reverse and electric braking. It consists essentially of a series generator, a series motor, a drum controller and an automatic, electrically actuated friction and ignition clutch. It replaces the flywheel, clutch, gearset, starting motor and lighting generator as used on the gear-driven car.

Fourth speed is the normal driving position. In this speed the drive is straight through from engine to rear axle. In all other speeds the transmission operates as generator and motor, the engine driving the generator to produce current which in turn drives the motor. Speed variations are obtained by varying the amount of resistance shunted across the field windings. Reverse speeds are obtained by reversing the connections to the motor armature.

The fields of both motor and generator are carried on the same field frame. This frame is bolted to the bell housing on the engine. The forward end of the generator shaft is rigidly connected to the engine crankshaft and the rear end of the motor shaft is attached to the propeller shaft. Direct drive is obtained by means of a clutch which connects the rear end of the generator shaft and the forward end of the motor shaft automatically. This clutch operates only when the controller handle is in fourth speed position. It engages automatically when the speeds of the two shafts are identical. Both generator and motor are of commutating pole type.

Speed changes are made by mov-

ing the controller handle which is mounted on top of the steering column. The controller is of the drum type and is divided into two sections—the main drum and the braking drum. The complete connections of the transmissions and controller are shown diagrammatically in Fig. 1.

Fig. 3 shows diagrammatically the connections for each position of the controller handle.

The generator is used as a motor to crank the engine. Putting the controller on the starting position throws the battery across the generator which then operates as a series motor and cranks the engine. The commutating pole field windings are not in circuit in this position.

In first, second, third and fifth speeds, and in both reverse speeds, there are two stages. The first stage might be called a period of preliminary excitation and the second the normal running condition for the particular speed.

The preliminary excitation of the generator field is an important feature of the Sperry equipment and it undoubtedly contributes much to the smoothness of operation. An ordinary series generator builds its voltage up from the residual magnetism in its field poles. When this residual magnetism is augmented by a small field current

(.1 amp.) the building up time is but a fraction of a second. However, when the field winding is shunted by a speed control resistance, the time taken to build up the voltage is quite appreciable. This lag in the generator voltage would cause a noticeable lag in the operation of the car. To avoid this lag and insure a quick "get away" the generator field winding has its speed control resistance disconnected and is momentarily excited by a small current from the battery.

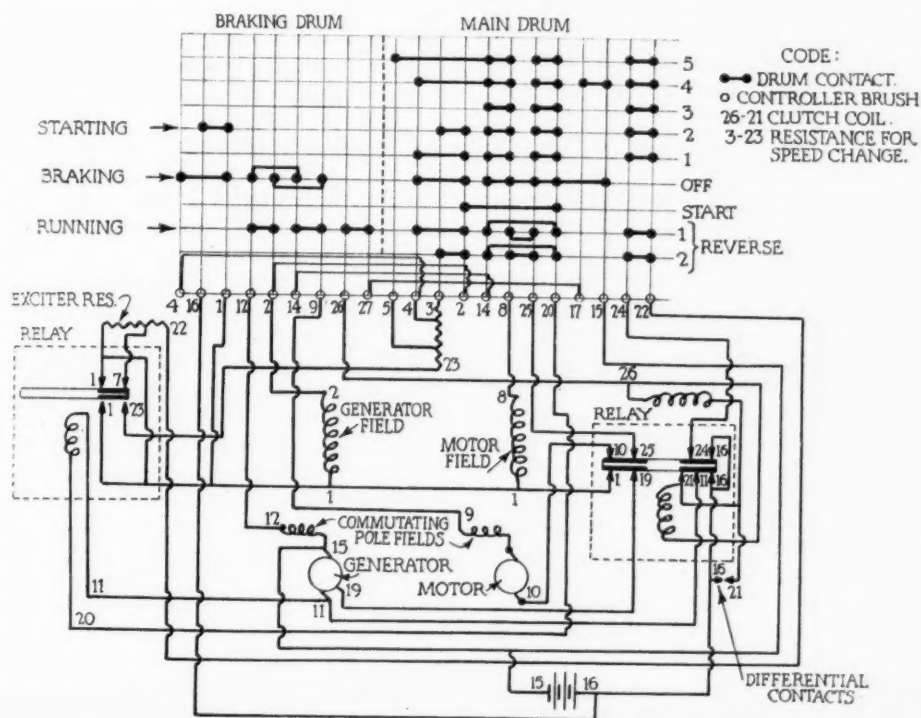


Fig. 1—Diagrammatic connections of Sperry transmission and controller

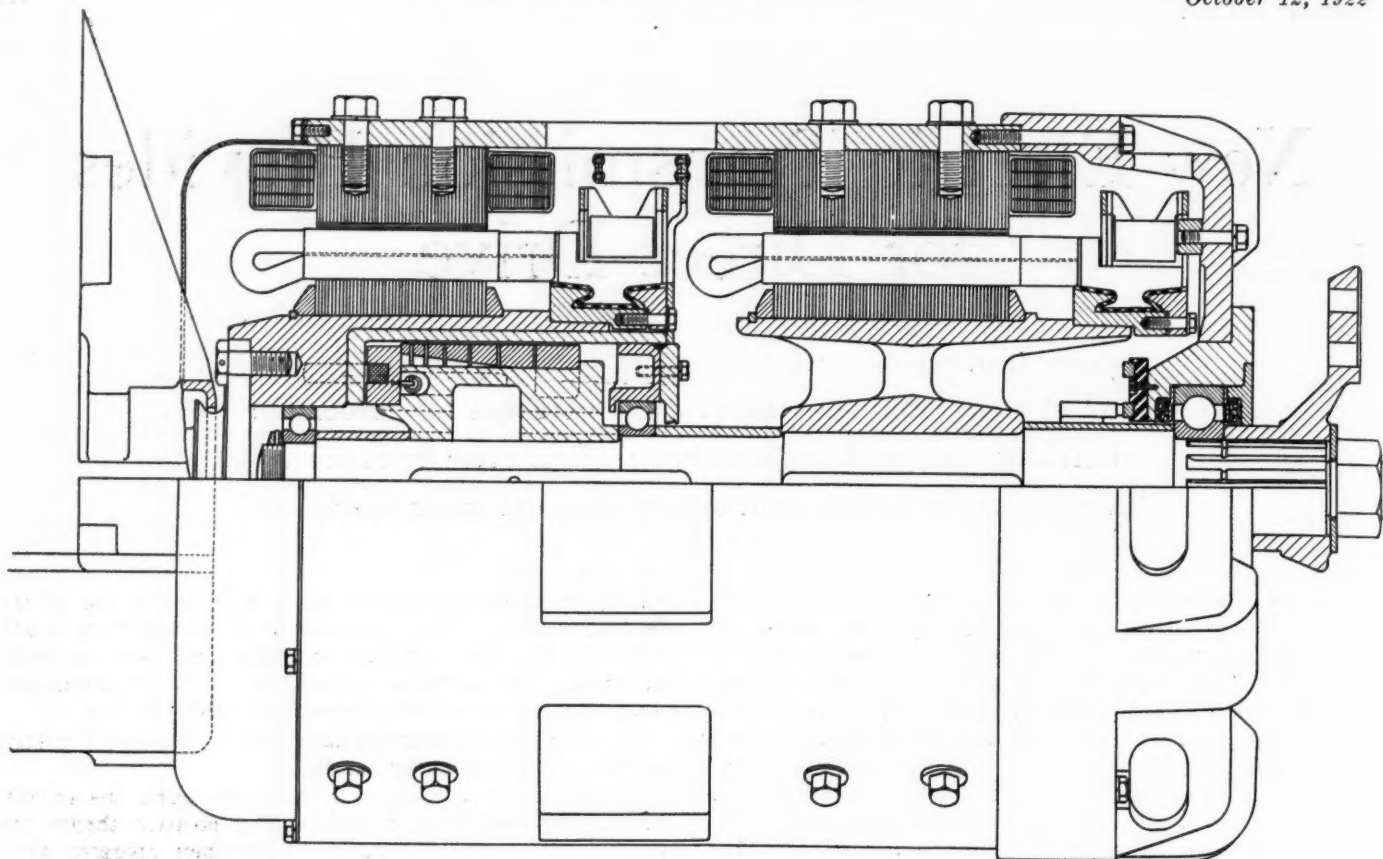


Fig. 2—Section through the new Sperry electric transmission. The field frame is bolted to the engine bell housing. The coil clutch is shown inside the generator armature which is the left unit

This excitation lasts until the output of the generator has risen to a predetermined value at which time a relay operates to connect the speed control resistance and reduce the battery excitation. Of course, if the generator output does not fall below this predetermined value as a result of a speed change, there is no need for outside excitation and the battery does not supply field current under this condition.

The exterior exciting circuit consists of the battery. Two resistances and the generator field, all connected in series. One of the resistances is in the neighborhood of 600 ohms. During the time that the generator field is being excited by the battery, this resistance is short circuited. The purpose of the second resistance is merely to limit the current flow as otherwise there would be nothing but the resistance of the series field winding to oppose the battery voltage. When the current produced by the generator reaches a predetermined value, which in the case of the experimental transmission is 35 amperes, a relay operates to remove the short circuit from the high resistance. The introduction of this resistance into the circuit cuts the current to less than .01 amperes. The length of time during which the field receives the excitation from the battery is so short that it cannot be measured with a stop watch. The purpose of this preliminary excitation is simply to supply a strong field as soon as the controller handle is moved to a new position. This enables the generator to produce the current required to drive the car without waiting for the voltage to build up from the residual magnetism.

The second stage commences as soon as the relay removes the short circuit from the high resistance. The generator then operates as a normal series generator to produce current to drive the motor. In all positions, except third speed, resistance is shunted across either the generator or motor field as soon as the period of preliminary excitation is ended.

In fourth speed there are four stages. The first two are the same as in other speeds. The third and fourth stages take place simultaneously. The third stage is the operation of the friction clutch connecting the generator and motor shafts. This takes place when the speed of the generator and motor shaft are the same. The clutch is operated automatically by an electromagnet, the current supply of which is controlled by a relay. The power consumption of the relay and electromagnet is about 20 watts. This relay is designed so that when the speed of the generator shaft (that is, the crankshaft) is the same as the speed of the motor shaft (that is, the propeller shaft) the contacts close, thus energizing the electromagnet and causing the clutch to take hold.

The clutch employed is identical in principal to a scotch coil clutch. It consists of a helical spring of oblong section one end of which is locked to the driven or motor shaft. The free end of the spring can be locked to the driving or generator shaft by magnetic attraction. This occurs when the electro magnet referred to above is energized. The spring is then caused to expand in the driving shell due to the unwinding action, the pressure being so great that the frictional contact on the hardened shell is ample to prevent slipping. Since the shafts which are thus locked together are turning at the same speed at the moment of engagement, there is no slipping on this account.

The clutch used in this case is located inside the armature of the generator and is concentric therewith. It expands in a steel shell which is fastened inside of the generator armature. The clutch operates in a closed compartment which is kept filled with oil. The construction employed is shown by the sectional drawing, Fig. 3.

At the same time the clutch takes hold the electrical connections between the generator and motor are opened, the generator is connected to the battery and, during the time the car is in direct drive, the generator charges the battery as a third brush machine. This is the fourth stage.

The automatic clutch takes hold smoothly and easily. In fact, during a ride in the experimental car, it was impossible to tell when it did take hold except by watching the needle on the ammeter in the generator motor circuit. Inasmuch as this circuit is opened when the clutch operates, the needle drops back from a reading of 100 or more amperes to the 12 or 15 required to charge the battery.

The electric connections in the various speed positions are as follows:

- First Speed:** a—Generator and motor in series, generator field being excited by the battery.
b—Generator and motor in series, resistance shunted across the generator field.
- Second Speed:** a—Generator and motor in series, generator field being excited by battery.
b—Generator and motor in series, resistance shunted across generator field. The shunt resistance is greater in this case than in first speed. Consequently the generator field carries a larger portion of the total current.
- Third Speed:** a—Generator and motor in series, generator field being excited by battery.
b—Generator and motor in series.
- Fourth Speed:** a—Generator and motor in series, generator field being excited by battery.
b—Generator and motor in series, resistance shunted across motor field.
c—Generator and motor shaft running at same speed, relay operates to supply current to clutch operating electromagnet and clutch engages. Engine now driving car direct. Motor carrying no current. Generator only producing current to recharge the battery.
- Fifth Speed:** a—Generator and motor in series, generator field being excited by battery.
b—Generator and motor in series, resistance shunted across motor field. This resistance is smaller than in fourth speed, b. Consequently the motor field is carrying a smaller portion of the current and the

weakened field results in higher motor speed. This speed corresponds to an over gear in a gear-driven car.

Reverse Speeds: a—Connections are the same for reverse speeds as for first and second speeds forward, except that the leads to the motor armature are reversed.

The experimental model was designed to operate with a six-volt battery. Under ordinary driving conditions the current in the motor and generator armatures does not exceed 250 amperes. The battery used in the experimental car is rated at approximately 125 ampere-hours. The motor develops 175 lb. ft. torque at 250 amperes with full fields, that is when there is no resistance shunted across the motor fields.

In a gear-driven car, multiplication of torque is obtained by means of gear reductions. In the electric transmission, this multiplication is secured in two ways. The inductors on the motor armatures are approximately 11 per cent longer than those on the generator armature. Furthermore, the relative strength of the field in both motor and generator are varied by means of shunt resistances. The torque required to drive a generator, or the torque developed by a motor is proportional to the strength of the field and the current carried by the armature. In the first-speed position we have a weak generator field, inasmuch as most of the current in the generator armature passes through the shunt resistance. The generator torque is consequently small in proportion to the motor torque inasmuch as the motor field carries the full current. In addition, the motor has the advantage of longer armature inductors. In the second speed position, the difference between motor and generator torque is not so great inasmuch as the resistance shunted across the generator field is larger and consequently this field winding carries a larger portion of the current. In third speed, the torques of the generator and motor are proportional to the length of the armature inductor. In other words, the motor torque is 11 per cent more than the generator torque. In fourth and fifth speeds, resistance is shunted across the motor field, which weakens them and tends to further decrease the ratio of motor torque to generator torque.

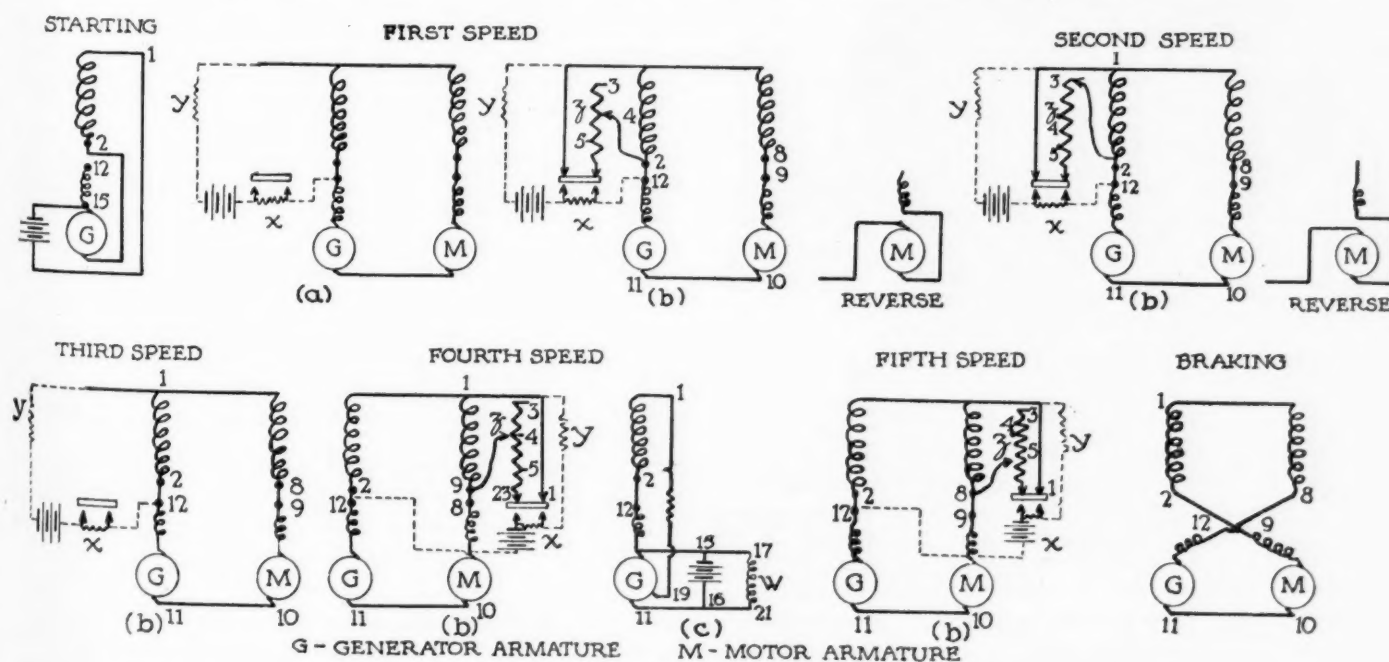


Fig. 3—Simplified connections in different speed positions. The numbers refer to the controller connections as shown in Fig. 2. The letters in parentheses under the diagrams refer to table of connections at various speed positions on this page. X is the high resistance in the battery exciting circuit and Y is the low resistance. Z is the speed control resistance. W is the coil of the clutch operating electro-magnet

The efficiency of the transmission when operating as a generator motor has a maximum value of about 80 per cent. Inasmuch as a first, second and third speed are only used for accelerating and for hill climbing, the efficiency in generator motor speeds is not usually important. The normal driving position is fourth speed with direct drive, and in this condition there are no electrical losses except the small amount of power required for the clutch operating electromagnet.

The electric brake simply reverses the direction of energy transmission. Under driving conditions the engine provides the energy which the electric transmission carries through the rear wheels to drive the car. When braking, the energy made available at the rear wheels through the deceleration of the car is transmitted forward to the engine and absorbed by engine friction and electrical losses. In braking, the motor acts as a generator to produce current which drives the generator as a motor. The energy developed by the motor is used up in overcoming the friction of the engine.

The electric brake is controlled by a foot pedal and can be applied with the controller handle in any position. The application of the electric brake simply reverses the generator and motor field connections. The higher the speed position of the controller handle, however, the less severe is the braking. In other words, the electric brake is least powerful in fifth speed and most powerful in first speed. In cases of emergency requiring a quick stop, the controller handle can be pulled down from any higher speed to a lower speed at the same time the electric braking pedal is depressed. In fourth speed the operation of the electric brake causes the clutch connecting the generator and motor shafts to disengage.

In driving forward, the ratio of motor torque to generator torque is progressively decreased by first increasing the strength of the generator field as in the first and second speed positions and then decreasing the motor field as in fourth and fifth speed positions. The same results are obtained in braking only in the reverse order. The ratio of the strength of the motor field, which acts as a

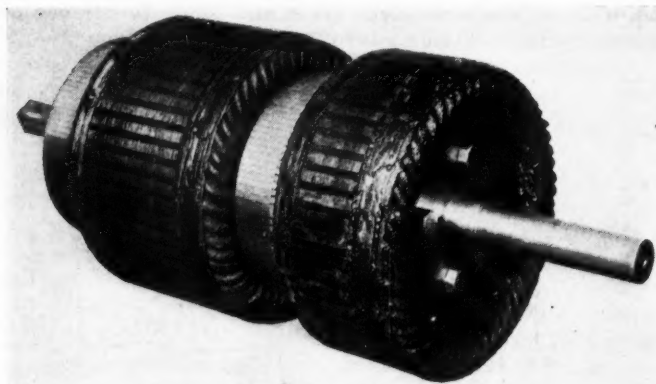


Fig. 4—The inductors on the motor armature are longer than those on the generator armature in the Sperry transmission

generator in braking, to the strength of the generator field, which acts as a motor, is progressively increased as the controller handle is moved from higher to lower speed positions. In other words, the torque required to drive the motor as a generator, which is the braking force, increases as the controller is moved from any position to the next lower position. The torque required to drive the motor as a generator is least in fifth position because the field is weakest because of the low resistance shunted across it. In fourth position the field is stronger and the torque required to drive is consequently larger. In third position there is no resistance across the motor field, hence the

torque required to drive it as a generator is further increased. In second and first speed positions the generator field, which acts as a motor during braking, is weakened by having resistance shunted across it. This means that the current consumption of this unit is larger. This larger current is, of course, carried by the motor armature which results in a further increase in torque required to drive the motor as a generator.

On the experimental car a friction brake is also fitted to supplement the electric brake. This car has been thoroughly tested in mountainous country and in city traffic. In neither of these conditions has the temperature of

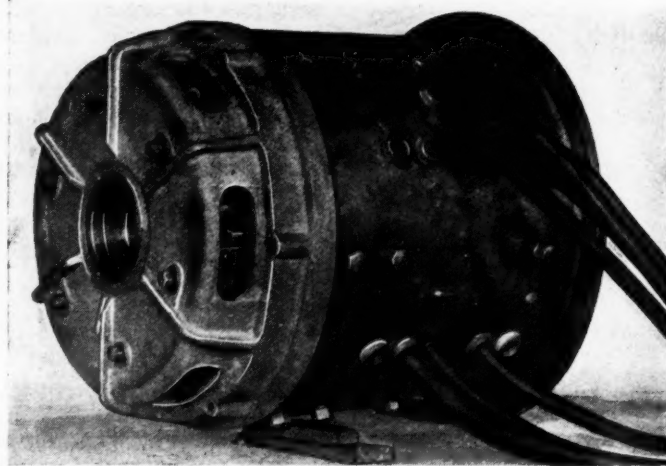


Fig. 5—The Sperry generator motor unit. It is 17 in. long and 14 1/4 in. in diameter

either of the units approached the danger point. A Sirocco type fan is fitted to the rear of the generator shaft to assist in cooling the transmission. There is, of course, no heating in direct drive on fourth speed.

The experimental car is very easy to drive even for one accustomed to the gear-driven car. To change from one speed to another either up or down, the controller handle is moved to the desired speed position. A spring stop is provided so that the handle cannot be pushed in reverse position accidentally. The car accelerates smoothly and the lag in acceleration, noticeable in the gear-driven car when the clutch is thrown out to shift gears, is, of course, entirely absent. To coast, it is only necessary to drop the engine speed to idling.

The experimental transmission weighs quite a bit more than the parts it displaces. However, in designing and building this unit no particular effort was made to reduce the weight. It is claimed that a unit designed for manufacture on a production basis will closely approximate the weight of the parts it displaces.

A GROUP of British motorcycle engine and accessory manufacturers have formed themselves into a research association constituted on lines which entitle them to a measure of financial assistance by the British Government.

The work done by this association bears upon basic principles of design and construction, and full details of every research, when completed are, of course, made available to each member of the group.

F. W. Lanchester has taken out a British patent on a magneto drive through a universal joint in which the irregularity in the transmission of motion by such a joint is taken advantage of to increase the speed of the magneto armature at the moment the circuit is about to be broken and the spark produced.

A New Means for Comparing Maximum Pressures in Engine Cylinders

Thin diaphragm inserted in cylinder head ultimately fails due to repeated application of high pressure. Time required for failure of disks of equal thickness is used for comparison. Effect of detonations are indicated by this means.

By Stanwood W. Sparrow and Stephen M. Lee *

A SIMPLE method of comparing maximum cylinder pressures has recently been found to give satisfactory results in connection with the internal combustion engine research at the Bureau of Standards. Thin metal diaphragms are used to indicate when various sets of engine conditions result in the same pressure. For a numerical measure of that pressure, a more complicated apparatus is, of course, necessary.

As shown in Fig. 1, the diaphragm is mounted in a spark plug shell between two metal washers. The metal disk which serves as the diaphragm is selected of a thickness such that, when subjected to the explosion pressure of the engine, the exposed portion will be sheared from the rim in a comparatively short time. If this is to take place, two requirements must be satisfied. First, the pressure must be high enough to produce shear. Secondly, the pressure must endure long enough or be repeated often enough to effect the complete shearing of the center from the rim. It is evident from this second requirement that the time required for a disk to fail as well as its thickness should be considered when comparing pressures by this method.

Fig. 3 shows the time of failure for aluminum diaphragms of three thicknesses. A fourth diaphragm .046 inch thick had not failed at the end of 11 minutes. There is little need for any further explanation of the method of using this device. With the engine operating under a definite set of conditions the time required to shear a certain thickness of diaphragm is noted. Changes are then made to produce the conditions under which a comparison is desired and again the time required to shear a disk of the same thickness is noted. An alternative method of

comparison is to substitute successively disks** of various thicknesses until one is found which fails in the same length of time as under the original engine conditions.

This device has been used on several occasions to demonstrate a fact frequently mentioned with reference to detonation, namely, that under certain conditions higher pressures result when firing from one spark plug than when firing from two. For these demonstrations the disk assembly was located as shown in Fig. 2 in an extra spark

plug hole in the side of an otherwise standard Liberty cylinder. A thickness of diaphragm was selected which, with the engine operating with a fairly early spark would withstand the explosion pressures for over five minutes, provided the engine was fired from both plugs. If, however, after one minute of operation the ignition wire was removed from plug A and the engine fired from plug B alone the diaphragm would fail almost instantly. The experiment merely constitutes a rather striking illustration of how the failure of one spark plug may result in a disastrous increase of explosion pressure.

From the experiments made at the bureau it appears that so long as diaphragms are made of the same material, check results can be obtained under the same engine conditions within rather close limits. In any event, the simplicity of the device commends its use for qualitative comparisons of a similar nature to that described above.

THE Trade Commissioner's office in Shanghai estimates that from 75 to 85 per cent of 3265 passenger cars and 270 motor trucks in use in Shanghai are of American origin, but since the conclusion of the world war and more especially since the beginning of 1922 the number of German-made cars has increased. However, based on value of the cars imported into China the United States supplied 47 per cent of the cars in 1918, 59 per cent in 1919 and 58 per cent in 1920.

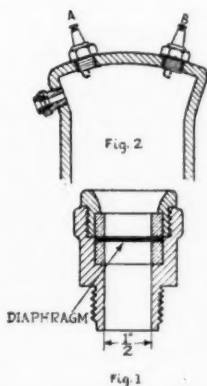
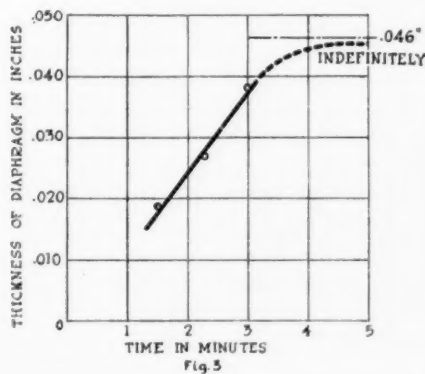


Diagram showing type of diaphragm plug and its location in relation to the spark plugs in a Liberty engine cylinder. The curve shows that the time required for failure of the diaphragm is, up to a certain point, directly proportional to the thickness of the diaphragm



*Technical Note No. 101, issued by the National Advisory Committee for Aeronautics. The authors are engineers engaged in research work at the Bureau of Standards.

**The material of which all the disks are made should be the same and should have received the same treatment.

What Makes for Easier Steering in Passenger Cars?

According to the belief of steering gear makers, inaccuracies in manufacture, careless assembly, incorrect design and lack of lubrication are chief causes of hard steering. 9 to 1 reductions considered adequate.

By J. Edward Schipper

RECENT demands on the part of automobile manufacturers for steering gears with reductions of 12 to 1 have left steering gear makers and engineers generally somewhat puzzled as to the trend of design. With the growing increase in city traffic and the difficulty of driving through congested centers, anything which makes control more difficult is seemingly a step in the wrong direction. The aim in designing is to reduce to a minimum the length of time between the perception of the driver and his ability to make the vehicle act as he desires. Steering gears with big reductions, such as 12 to 1, lengthen the time interval appreciably because of the greater motion required on the steering wheel to accomplish a given result on the front wheel.

What is the cause for the demand for such a large reduction? One conclusion is that, in some instances, it is due to the desire to overcome by main force resistances to steering gear action which should not be encountered. In other words, careful study indicates that by properly designing the gear, reductions as low as 6 to 1 and certainly 9 to 1 may be used with perfect safety and without great difficulty in operating the car. The argument advanced that gear reductions of 12 to 1 are necessary because of the large number of women driving cars carries some weight, of course, but, at the same time, many steering gear manufacturers and engineers who are experts in this particular field claim that with a 9 to 1 reduction it is perfectly possible properly to design the steering gear so that the car will steer readily enough to give no trouble to any normal woman.

We are, of course, starting with the assumption that the steering gear is a free, easily operating gear when it is delivered to the car assembler or manufacturer. Given this premise, a great many factors may be introduced into the chassis assembly which will either make or break the reputation acquired by the steering gear maker. The first mistake in steering layout can be

HARD steering is a fault frequently causing criticism on the part of users of present day cars. The steering gear maker is sometimes inclined to attribute the trouble to faults in portions of the steering system outside the gear proper. Undoubtedly there is often good ground for such complaints. In any case this view of the subject is here expressed.

We intend to publish in an early issue the views of car manufacturers. Engineers qualified by experience to discuss the subject are invited to express their views in letters intended for publication in the Forum.

made by using a pitman arm which is so long or so short that it will not properly function. A rule used by Kenneth Dean, who is road engineer for the Lave steering gear, is that the length of the pitman arm should be such that a line through the front spring bolt passing through the center of the ball on the steering arm should also pass through the center of the ball on the pitman arm with the car under load.

A number of companies have been consulted by AUTOMOTIVE INDUSTRIES on this problem of steering

and the following miscellaneous notes are the result of discussions of this subject with engineers in plants of leading car manufacturers, as well as some of the axle manufacturers and steering gear makers.

Several manufacturers say that anti-friction bearings should be used on the pivot pins if the price of the car at all justifies the cost. If plain bearings are employed, a ball thrust should be used to take the weight of the car otherwise the shoulder which carries the weight is likely to pound out the lubricating film to such an extent that considerable friction exists at this point, due to metal to metal contact. This is one of the points at which friction is apt to develop. It is obvious that with one or two of these binding points in the gear, an otherwise good design is rendered unsatisfactory. Elimination of these points of friction throughout the steering gear assembly will make it unnecessary to use such reductions as 12 to 1.

There has been a tendency lately to use a polished ball end instead of the plain turned end. This is considered desirable as a turned ball end has high spots which can cut through the lubricating film and tend to bind on the cup. This is one of the points in which more careful manufacturing will give better results as far as easy steering is concerned. There are several other instances in which manufacture is directly responsible for the results obtained in steering. A good example of this is in the alignment of the king pins. If these are

not in the same plane, within very close limits, a twist is set up in the steering linkage. In recent installations at front axle manufacturing plants, the entire front axle is placed in a jig and both of the king pins are drilled simultaneously. With the alignment thus established, little or no trouble should develop at the king pins.

On the other hand, when one king pin hole is drilled, the axle reversed and the hole drilled for the king pin on the other end, an error is apt to creep in unless very careful provisions for location are made. On some of the latest tools for front axle manufacture, not only are the two king pins drilled simultaneously but the spring pads for the front springs are milled at the same time. This gives an axle on which proper king pin alignment is practically assured.

When the steering arms are not parallel, another point of misalignment appears which causes considerable trouble in steering. Under this condition a twist is put in the tie-rod every time the front wheels are turned, the effect being similar to that which occurs with misaligned king pins. This causes binding and resistance to operation of the steering linkage. Too much spring in the steering arm is another feature which causes binding.

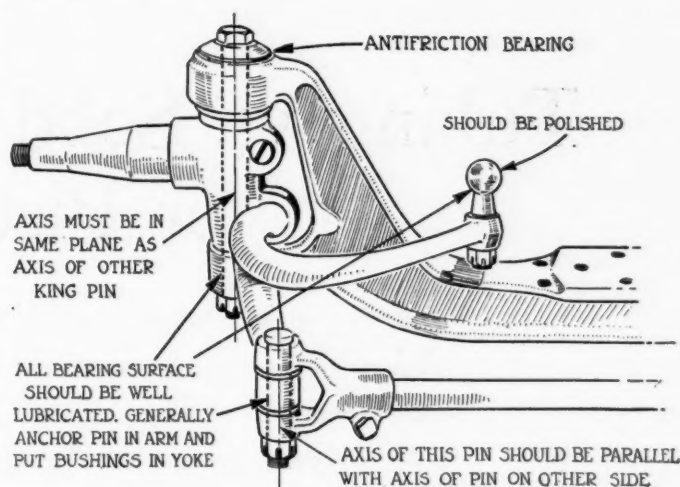
Even with well aligned and properly manufactured parts resistance is set up if lubrication is inadequate. Grease is employed frequently for lubricating the king pins. Since grease will not flow like oil, if it is to be used, it must be put in under pressure. When this pressure is not properly exerted on the grease to force it down the entire pin, it often happens that the top of the pin will be lubricated and the bottom will be dry, with the result that it binds and, naturally, results in hard steering.

Perhaps the greatest cause of binding steering gears, however, is the forcible assembly of steering gears which are not properly fitted to the chassis. Many instances have been found in which the car assembler has sprung the steering column cross-wise to make the bolt holes meet. Naturally, with a column sprung in this manner, it is useless to expect easy steering. Assemblers should shim the bracket on the frame, if necessary, or set the bodies so that the steering column bracket bolts would fit properly. By so doing a great many complaints of hard steering would be eliminated.

STEERING gears should be hooked up before the bodies are bolted down. If this is not done, there is a temptation to spring the steering column into place.

Elimination of points to which the owner must give attention is helpful. A good example of this is the bearing under the steering wheel at the upper part of the column. It has been the practice generally to put a small oil hole here to take care of the babbitt bearing which is sometimes employed at the top of the column. When the car is new, owners will put a few drops of oil at this point and be troubled perhaps with the oil running down the column and soiling gloves or clothing. They either will stop oiling this bearing for this reason or because they simply forget it. This makes it advisable to use a self-lubricating or graphited bearing. Experience has shown that it is possible to use these with success at this point and as a result an element of chance is eliminated and another point of bind removed.

One of the biggest problems in connection with easy steering is to get the proper caster in the front wheels. Steering gear manufacturers recommend not over $1\frac{1}{2}$ to 3 deg. caster and, in connection with the normal caster, the front springs should be so designed that when deflected a negative caster is not put on the front wheels.



Some items to be borne in mind when designing parts of the steering system with a view to making steering easier

This is generally taken care of by designers who offset the front spring 1 to $1\frac{1}{2}$ in., thus eliminating any chance of the deflection of the springs having such an effect on casters.

A similar problem arises in connection with the inclined pivot which gives hard steering at slow speeds. Easier steering and a minimum of road shocks are given, according to general experience, when the pivot axis is in line with the inner edge of the road contact surface area of the tires. This effect is secured by the proper angle of the steering knuckle and is an important factor in steering, particularly at slow speeds. There is not absolute agreement on what is the best practice in this respect. There is a tendency among European manufacturers, particularly those using front wheel brakes, to bring the pivot center directly in the central plane of the tire area, but American manufacturers as a whole are inclined to have the pivot center intersect the ground at the inner surface area of the tire contact.

These scattered notes are indicative of a few of the points which steering gear manufacturers encounter in gears after they are installed. The angle of the car manufacturer on this point is interesting and **AUTOMOTIVE INDUSTRIES** soon will publish a number of comments from car manufacturers on this important problem. The opinions and comments of engineers are invited and a discussion of this subject should produce some interesting comments for the Forum.

A NEW plywood has been placed on the British market under the name "Consuta." It has been designed with the idea of avoiding the danger of the wood layers splitting apart under exceptional conditions of weather or climate.

In this plywood the layers of wood, after being cemented together, are sewn through with rows of parallel stitching. It is made in thicknesses from $1/16$ to $5/8$ in. and up to 60 ft. long and 8 ft. wide, the number and thickness of the laminae being varied to fit the exact purpose for which the wood is required. The direction of the grain can be varied, as for example, in the cover of an airplane wing the grain is laid in reverse diagonals, giving a girder type of construction.

Until recently the material was hand sewn, which made it very expensive, but machinery is now used for that operation. Each stitch has a strong independent hold so that the material may be cut anywhere.

Originally this plywood was intended for racing boat hulls, but it has since been used for construction of light motor vehicle bodies as well as in aircraft work.

Tubing vs. Solid Stock as Material for Piston Pins

Comparison of manufacturing costs difficult. Experience shows solid stock cheaper in small pins. No difference in quality, when same grade of steel is used. Tubing pins of inferior material likely to create unjustified prejudice against type.

By C. B. Fraser

Production Engineer, King Sewing Machine Co.

IN the manufacture of any standard article where there is a choice of materials, the question as to which one to use depends on four main factors:

1. Initial cost of the material in question.
2. Cost of manufacturing the article from that material.
3. Quality of final product.
4. Ease with which the product, made from that material, can be sold.

That material will be used which has the lowest initial and manufacturing cost, consistent with the desired quality of the final product.

The manufacturer of piston pins finds two kinds of raw material offered him—solid steel and steel tubing.

For the purpose of the present discussion, the exact kind of steel is immaterial. The writer has in mind exclusively SAE 1020 and SAE 3120. The latter costs between two and three times as much as the former, but any statements about the one holds good for the other with this price difference always in mind.

Tubing usually costs about four times as much as an equal weight of solid stock, but it makes from 30 to 45 per cent more pins. This statement is far from accurate, however, since a fair comparison between tubing and solid stock, as to actual material cost per 100 pins, is very difficult to make. Equal weights of stock of the same outside diameter cannot be taken as a basis because many more pins can always be made from the tubing than from the solid stock, since the former weighs so much less per lineal foot.

The actual percentage increase varies with the wall thickness. For instance, if twenty different pins can be made from 1 1/16 in. solid stock, and a given weight of 1 1/16 diameter tubing will make 40 per cent more of one of the pins than the same weight of solid stock, it does not follow that comparing the price of 100 lb. of solid stock with that of 100 lb. of tubing and allowing 40 per cent increase will give a reliable figure on the relative material costs for the other 19 pins. At least three different kinds of 1 1/16-in. tubing would be needed for the 20 pins, and the percentage of increase in pins obtainable from a given weight of tubing would be different for each kind.

A given pin made from tubing, moreover, requires a larger diameter stock than the same pin from solid stock because of the drawing scale on the outside which must be cut through. Nor can equal lengths of the same or

corresponding diameters of stock be used as the basis of comparison because the price of tubing varies not only with the outside diameter but also with the thickness of the wall even where the diameter remains constant, and this is a factor which does not exist in the case of solid stock. For instance, suppose that 20 different pins can be made from 1 1/16-in. diameter solid stock and that 1 1/8-in. diameter tubing would cover these 20 pins so far as outside diameter goes, it does not follow that comparing the price of 1 ft. of the solid stock with that of 1 ft. of the tubing would convey any accurate idea of the relative material costs. At least three different kinds of 1 1/8-in. tubing would be needed for the 20 pins, probably more, and the cost would be different from each size.

It is this extra factor of wall thickness which prevents even any general comparison between costs.

Wall Thickness

As the diameter decreases it cannot be said that tubing either decreases or increases; it does both, depending on wall thickness. The only way to compare the two is to take a representative group of the pins to be manufactured, at least twenty different ones, including all sizes from the smallest to the largest. Compute the cost per 100 pieces on each pin, first from the solid stock, then from tubing; compute, from solid stock and tubing, the labor and overhead involved in bringing each pin to a stage of manufacture at which remaining operations are exactly the same; add up these material and labor costs for each pin from each material and then compare results. This method involves consideration of differences in cost of manufacture, but comparison of material prices alone in the case of tubing and solid stock is of little significance.

The method of manufacturing pins from solid stock differs from that in making them from tubing only in that pins made from solid stock have to be drilled as well as cut off, while pins made from tubing have only to be out of oil. Subsequent operations are identical.

In pins with holes less than 5/8 in. in diameter cutting and drilling is done on automatic screw machines in two operations, costing from 36c. to 48c. per 100 pieces. In pins with holes 5/8 in. in diameter or over, it is done in one operation, costing from 65c. to \$1.65 per 100 pieces. The cost varies with the length, the diameter of the hole and the machine used. In the case of pins

made from tubing, the cutting off is one operation, costing from 15c. to 28c. per 100 pieces, depending on the outside diameter, the wall thickness and the machine used. It will thus be seen that tubing pins cost from 18c. to \$1.33 per 100 pieces less than solid stock pins in labor alone and overhead will usually at least double that. Our experience, however, is that the initial material cost more than makes up for this.

In the smaller pins there is no comparison at all. The initial tubing cost tends to be at least as high per 100 pieces as in the larger, though less steel is used, and the difference between cutting off as compared with drilling and cutting off, is less than in the larger pins. The net result is a disparity so greatly in favor of the solid stock that tubing is not to be considered at all.

Solid Stock Cheaper

In the larger pins the increase in tubing cost per 100 pieces over the small sizes is not so great as in the case of the solid steel and the difference in cutting off as compared with drilling and cutting off is greater, especially where the drilled hole has to be reamed as well as it does in most of the larger pins. The result is that the costs of the blanks are much closer together.

In ten cases of large pins we found that seven of them were cheaper to make from solid stock than from tubing by an average of \$1.57 per 100 pieces, while three of them were cheaper from tubing by an average of 21c. per 100 pieces. This was sufficiently in favor of the solid stock to convince us that unless a very large production was contemplated of one of the pins which happened to be cheaper from tubing, it would be far better to use solid stock exclusively and take the slight loss on the one or two pins which seemed to favor the tubing.

There is still another fact which must be noted when considering initial and manufacturing costs, though it is hard to classify it wholly under either of these heads. The use of tubing compels the carrying of a much more varied stock of steel than does solid stock since there is an extra dimension to be considered—wall thickness. A given size of solid stock can be used for all pins of approximately that outside diameter, and at a pinch for all pins up to that diameter.

Not so with tubing, for different pins of the same outside diameter vary by as much as $\frac{1}{8}$ in. in wall thickness and each variation requires a different size of tubing, or else an expensive drilling and reaming operation, the avoidance of which is one of the chief reasons put forward for the use of tubing. At first sight it might not seem a great disability to have to carry a few more sizes of steel, especially when the total stock would quite probably be from 20 to 30 per cent less, but piston pins happen to be a product where this is a factor of very great importance. Sales of different pins fluctuate widely and without the slightest notice. To balance this a stock of a minimum number of sizes, each of maximum availability is highly desirable. The more pins one kind of steel will make the more chance of making up an unexpected drain, and the greater ease with which an adequate stock is maintained. So important have we found this to be that we have grouped pins of approximately like outside diameter and made blanks for the groups, any pin of the group being obtainable from the group blank. In this way the number of different stock sizes needed has been reduced to about 30 and of these about 11 are duplicates in SAE 3120 steel of sizes also called for in SAE 1020. These 30 sizes make over 150 different pins covering 800 or more makes of cars and trucks. If tubing were to be used the number of sizes would be at least double and even so a very large percentage of the material would have to be redrilled and rereamed.

So far, then, comparison between solid stock and tubing is decidedly in favor of the former. There remains quality of product and ease of sale as factors still to be dealt with. Of the former there is very little to say. Provided the same quality of steel is called for, the fact that it is bought in tubing or in solid form makes no difference whatever, so far as we have been able to find out, in the finished product. Exactly as good pins can be made from tubing as from solid steel. The only possible differences are that tubing is sometimes seamed which results in a higher scrap and that it appears to be more difficult to eliminate soft spots in the hardening than is the case with solid stock. But our experience with regard to both these defects in the use of tubing is not positive enough to make us feel that they are of first importance.

Consideration of ease of sale, however, reveals a very different state of affairs. Tubing lends itself to use by small manufacturers without any large equipment of automatic machinery. Tubing pins can be cut off on a hand screw machine nearly as cheaply as on an automatic screw machine. For this reason some replacement pins have been made from screw steel tubing, seamed tubing, gas pipe or any other cheap material that could be bought.

Of course, the pins failed to stand up under use. Buyers soon found that most of these worthless pins were made from tubing because of the long parallel drawing marks inside the hole, and promptly condemned all tubing pins out of hand. As a result it is almost impossible to sell tubing pins in some districts and difficult everywhere. The sales resistance is far higher than with solid stock pins. If the manufacturer eliminates the drawing marks by drilling or reaming, the cost of manufacturing the pins from tubing is brought as high or higher than those from solid stock, making the total disparity in favor of solid stock very great. Consequently the manufacturer is nearly compelled to use solid stock if he wishes to sell his product.

This situation may possibly be temporary. Some method of eliminating the tell-tale drawing marks or possibly a deliberate branding of a certain make of tubing coupled with intensive advertising of the brand, might remove what prejudice now exists.

Tractor Market in Chile

A REPORT to the Department of Commerce estimates that there are between 135 and 150 tractors in service in Chile at the present time. Most of them are of American origin. A few British Austin tractors are in use, and in addition, there are agencies for the sale of the German Lanz tractor and the French Renault and the Semua, but as yet they have found little sale. The average selling price for tractors in Chile is around 5000 to 5500 gold pesos for a 10-20 hp. machine; 6800 to 7000 gold pesos for a 15-30 hp. machine, and 13,000 gold pesos for a 20-40 hp. machine.

Although tractor agencies are in the hands of the largest and best equipped commercial houses in Chile, which have branches or connections in all the principal centers, success in the field has not been as encouraging as might have been expected, considering the number of tractor sales effected in the neighboring republic of Argentina. One of the greatest difficulties has been found to be the ignorance of the average farm hand and his utter lack of mechanical aptitude. Farm help, though inefficient, is cheap; the maintenance cost of oxen is insignificant, and the average farmer is satisfied with the results attained through the use of the facilities at hand.

Proper Kiln Drying Will Reduce Timber Losses

Sap-stain, mold and incipient decay in green wood cause severe losses to manufacturers yearly. Office of Investigations in Forest Pathology proves importance of using prophylactic measures. Kiln drying most effective method of treating green timber.

By Nathaniel O. Howard*

DETERIORATION in lumber brought about through sap-stain means the discarding of timber on a large scale yearly. Severe losses frequently occur through this cause during shipping and storage of wood by manufacturers of vehicles and vehicle parts.

In 1918 the attention of the Office of Investigations in Forest Pathology was turned to the staining and molding occurring in green raw material and resulted in a series of studies covering the entire range from the time lumber was cut until it was turned in manufacture.

Investigation showed that much of the difficulty then being experienced was due to the fact that a shortage of cars for shipment brought about careless methods, and that the factor of time prevented proper seasoning and necessitated the use of more green wood than normally. Much of the trouble still persists and the study conducted should assist in its alleviation.

To prevent checking many manufacturers demand that wood be shipped in a green state rather than take the chance of having it improperly seasoned at local plants. These manufacturers have to contend with the troubles incurred during shipment.

The term "sap stain" refers to the blue, green, brown, or red discoloration which is often found in sap wood of timber derived from several kinds of broad-leaved and coniferous trees. There are two classes of sap-stains:

- (1) The chemical stain said to be produced by chemical reactions brought about through the agency of certain oxidizing enzymes present in the wood itself.
- (2) Fungous stains known to be caused by several species of fungi.

The first class of chemical stains which cause discoloration, develop during air-drying, particularly under warm and humid conditions, or in the kiln. In kiln-dried lumber they can be prevented to an extent by the use of comparatively low temperatures and correspondingly low humidities. These stains do not impair the strength or durability of timber and hence cannot be considered of great economic importance.

There is another fungus group, the molds, which occurs on freshly cut green timber. The chief objection to mold lies in the discoloration due to the mycelium, which appears on green sapwood and sometimes heartwood. These growths can be sanded or planed off, often even brushed off. The presence of this mold gives an un-

favorable appearance to lumber as it indicates conditions which are favorable to decay.

The development of fungi depends on four factors: air, containing the necessary oxygen; moisture; temperature and food substance. It is necessary then to watch these factors.

Since blue stain and mold fungi cause little or no dissolution of the wood fibers, they do not affect directly the durability of the timber. If properly piled and dried, stained or moldy wood stock free from decay should not deteriorate further from the action of the fungi.

The presence of an abundant growth of mold or sap-stain in green stock indicates conditions which are likely to further the growth of rot, but rot is caused by a distinct group of wood destroying fungi which develop independently.

A great many attempts have been made to devise measures for the control of sap-stain and mold in green timber. With the exception of kiln drying, none of these has proved entirely satisfactory. For the most part these measures are prophylactic rather than curative in nature. However, they will assist in reducing losses from sap-stain, mold and incipient decay in green stock.

The average automotive manufacturer does not supervise the handling of lumber in the field, and the problem of proper care does not concern him until the lumber is in the factory yard. Any prophylactic measures would have to be employed then.

The first provision is that logs, bolts and split billets should be sawed into dimension stock of planks and manufactured as soon as possible. This will do much to safeguard material by reducing the time in storage. Provided kilns are not available, the dimension stock should be seasoned from six months to a year or more, depending on the size and kind of material.

IN all cases where air seasoning is resorted to, unless great care is exercised in providing for ample circulation of air through the stock by such means as open piling, fungous and insect troubles are likely to develop. It is absolutely necessary to strip or cross pile the stock upon dry foundations. Sheds for the storage of this material should be dry and well ventilated.

*Pathologist, Office of Investigations in Forest Pathology. Digested from U. S. Department of Agriculture Bulletin No. 1037.

By far the most effective and quickest method of treating green stock, as a prophylactic measure to destroy fungi or insects and reduce shipping weight, is to subject the material to proper kiln drying. When producers are equipped with, or have access to modern kilns operated on a scientific basis and are so situated that stock can be moved rapidly, less concern need be given to fungus troubles.

Material kiln dried directly from the sap has been shown to be just as good as air seasoned stock and in many cases much better as far as strength, toughness and freedom from defects are concerned. Moreover, the time necessary for seasoning can often be reduced from one year to three weeks or from three to five years to as many months.

Kiln drying eliminates or reduces losses due to insects, or to checking rotting, staining, or molding; improves the quality of lumber; reduces the amount of yard space; and saves the tying up of capital and carrying costs.

In dry kilns, stripping or cross piling the stock and providing means to prevent stagnation of the confined air are absolutely necessary if the development of mold is to be avoided. The water spray kiln devised at the Forest Products Laboratory represents one of the latest developments in the temperature and humidity controlled type of kiln.*

During the first few weeks of kiln drying, when the humidity is high and the temperature ranges from 80 deg. to 105 deg. Fahr., an abundant growth of white mycelium occasionally forms between the courses and interferes more or less with the circulation of the air in the kiln. This is due to the presence of mold fungi, and it usually indicates stagnation in the kiln. Steaming for an hour at a temperature of 160 deg. to 180 deg. Fahr.

*Complete description in Bulletin No. 509, U. S. Department of Agriculture.

has been found effective in destroying or at least checking the growth of this mold.

Steaming certain kinds of stock is sometimes resorted to as a means of reducing shipping weight by hastening drying or to even up the color and reveal defects in the wood.

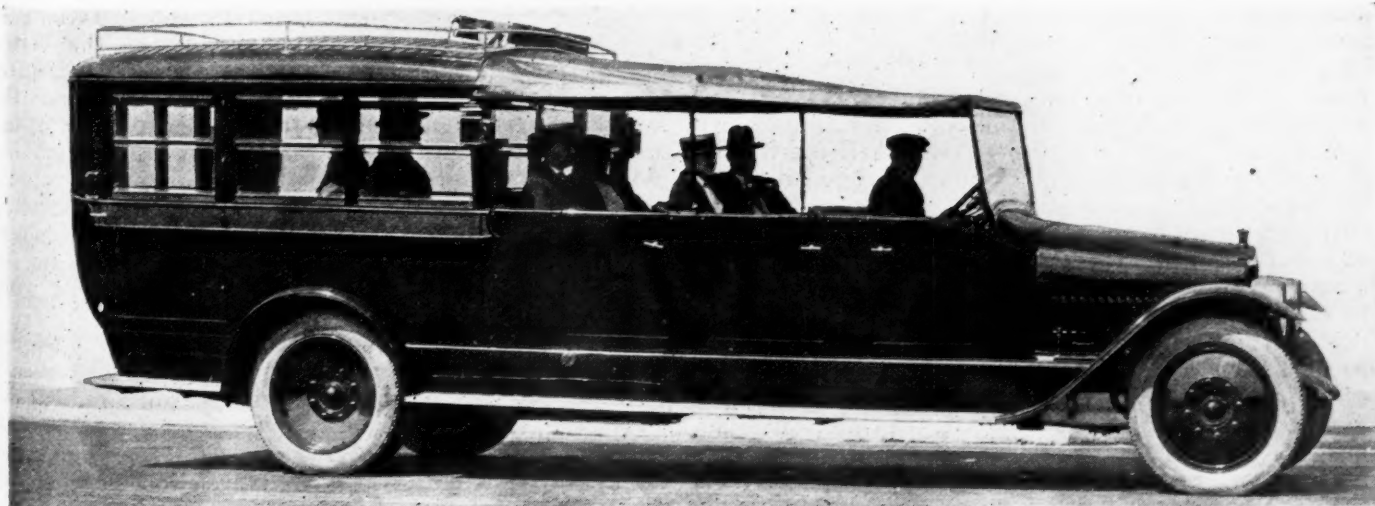
In the steaming of green gum lumber a large steel tank, or preparator, is employed. The lumber loaded upon trucks is run into this preparator and steamed for perhaps 15 to 30 minutes at pressures of 20 to 30 lb. Provided this lumber is then carefully open piled, it remains clean. When close piled or when exposed to adverse weather conditions, however, it may mold almost as readily as untreated green lumber.

Many attempts have been made to find some chemical compound or mixture that, when applied as a dip, will control sap-stain and mold in green timber. A great many substances have been tried but none has proved entirely satisfactory. Under conditions not particularly favorable to the growth of fungi several have met with considerable success. On the other hand, if the conditions were stimulating to fungous growth, the same substances often failed.

SOME treatments depend for their efficiency upon the neutralization of the acids in the wood, and at the same time the establishment of alkaline conditions. To this group belong sodium carbonate, sodium bicarbonate, sodium hydroxide, lime and borax. Others are intended to poison the food of the fungi, and comprise such compounds and mixtures as mercuric chlorid, copper sulphate, sodium fluorid, creosote and many other substances.

It is evident that the prevention of sap-stain, mold, and incipient decay in green material and in vehicle stock in particular, lies in a combination of remedial factors, no one of them in itself a sovereign remedy.

The New White De Luxe Bus for Long Distance Touring



A new reflection of the rapid development that is taking place in the motor coach and motor bus field is found in the appearance of a foreign type of de luxe coach, known as "voiture de grand tourisme," meaning a car for extensive touring. This type, which has just been brought out with Rubay coach work on a White Model 50 chassis, is a faithful copy of the motor coaches which are operating between Paris and Monte Carlo

Glider Results Point Way to Sport Plane Development

Wing weight per sq. ft. cut in half as result of soaring flight experiments. Two horsepower engine would maintain winning German machine in level flight in still air, allowing for propulsive efficiency of 70 per cent. Lessons for low-powered airplane design.

By Edward P. Warner

WHEN Hentzen started his series of record-breaking gliding flights last August, culminating in the three-hour cruise of August 24, he created a world-wide interest which led to a perfect torrent of press comment on the meaning of such performances to the future of aviation. The general tendency has been to be very generous in estimating the extent to which soaring can be expected to enter into and form a part of ordinary flying.

It is obvious that the glider's contribution will be different, in nature and in extent, in respect of different types of airplanes. As far as the pursuit airplane, loaded ten or twelve pounds per square foot, or the very large commercial or bombing machine is concerned not much can be expected in the direct application of structural methods, although it may be possible to profit in design by the experience gained with the ingenious controlling devices fitted to some of the gliders in place of or as supplements to the ordinary run of airplane controls seen on conventional machines.

With small machines, however, and particularly with those of very light loading, the outlook is more favorable. The next few years may see a great development of the sport-plane, which must be cheap to build, easy to fly, endowed with a very low landing speed, and exceedingly economical of power. Such airplanes have a great deal in common with the glider, which furnishes a means for the study of engineering features later to be incorporated in the powered machine. The closeness of the connection between glider and sport-plane was exemplified especially well at the French competition this summer, where several of the most successful flights were made by gliders which were merely small airplanes with the engines removed, with some of the structural parts lightened, and with the pilot's seat moved forward as much as necessary to restore balance after the removal of the power plant.

The successful sporting machine must be lightly loaded, and unit structural weights, such as the weight of

the wings per unit of surface, must therefore be low; lower than has ever been found necessary in airplane practice in the past. Only in the glider has experience been secured in the construction of wings which run far below the conventionally accepted airplane wing weight of one pound per square foot, together with fuselages and tail surfaces proportionally light. Striking illustrations of what can be done are afforded by the Fokker and Coupet gliders, the total loading of which with the pilot on board was only about one pound per square foot, while the weight of the wings themselves contributed less than a third of that total in each case.

The building of wings so light requires constructional practice quite distinct from that usual in airplanes, where it has always been assumed that there was both a relative and an absolute minimum of unit weight attainable, the absolute minimum being imposed by considerations of the rigidity of the structure. It has been accepted, for example, that the

weight of a wing truss should be about 13 per cent of the total weight carried by the airplane unless the loading was very light, but that the percentage increased rapidly as the loading decreased beyond a certain point, wing weight approaching an absolute minimum in the neighborhood of .4 lb. per sq. ft., a figure which could not be bettered no matter how light the loading of the wing might be.

The cutting of this minimum to nearly half its former value, which has taken place in some of the recent gliders, has been accomplished only by such radical departures as the construction of spars of I-form with plywood webs containing generous lightening holes and by the introduction of new covering materials and protective coatings.

A whole new scheme of doping, for example, has been evolved by some of the German experimenters, as the weight of the doped and painted fabric alone as now used on American seaplanes is substantially the same as the entire weight of the glider wing structure.

EDWARD P. WARNER, the writer of this article, is Professor of Aeronautical Engineering at the Massachusetts Institute of Technology. He has recently returned from France and Germany, where he attended the glider trials which have caused so much comment in this country.

In this special article for *Automotive Industries*, he discusses the possible applications to commercial practice of the lessons learned from the glider trials.

It is, of course, possible that the sport-plane will ultimately reach the stage where it will be produced in quantity entirely of metal. When that time comes, the methods of manufacture will stand as a problem apart from everything else and glider experience will be of little use. The arrival of quantity production is far away, however, and so long as sporting machines continue to be built of wood and fabric their builders will be able to profit by the work of those working with motorless aircraft.

Glider Experiments Fruitful

A study of the results obtained with gliders during the past year appears at first sight to give ground for optimism regarding the possibilities of the low-powered airplane. The most efficient gliders seem to be capable of traveling normally without dependence on rising currents with a rate of fall not in excess of two feet a second.

Since the Hanover machine, proven the most efficient of all, weighs about 400 lb. including the pilot, the power necessary for the maintenance of level flight in still air would be 800 ft. lb. per second, or a little less than one and a half horsepower, delivered at the propeller. Allowing for a propulsive efficiency of seventy per cent the engine would have to develop two horsepower. The installation of an engine, however, even of power so moderate as that, requires strengthening the structure to carry added stresses and also increases the load that is supported by the weight of the power plant itself.

The power just calculated, too, allows no reserve but requires that the machine always fly just "tangent," barely able to support itself, and this is a condition in

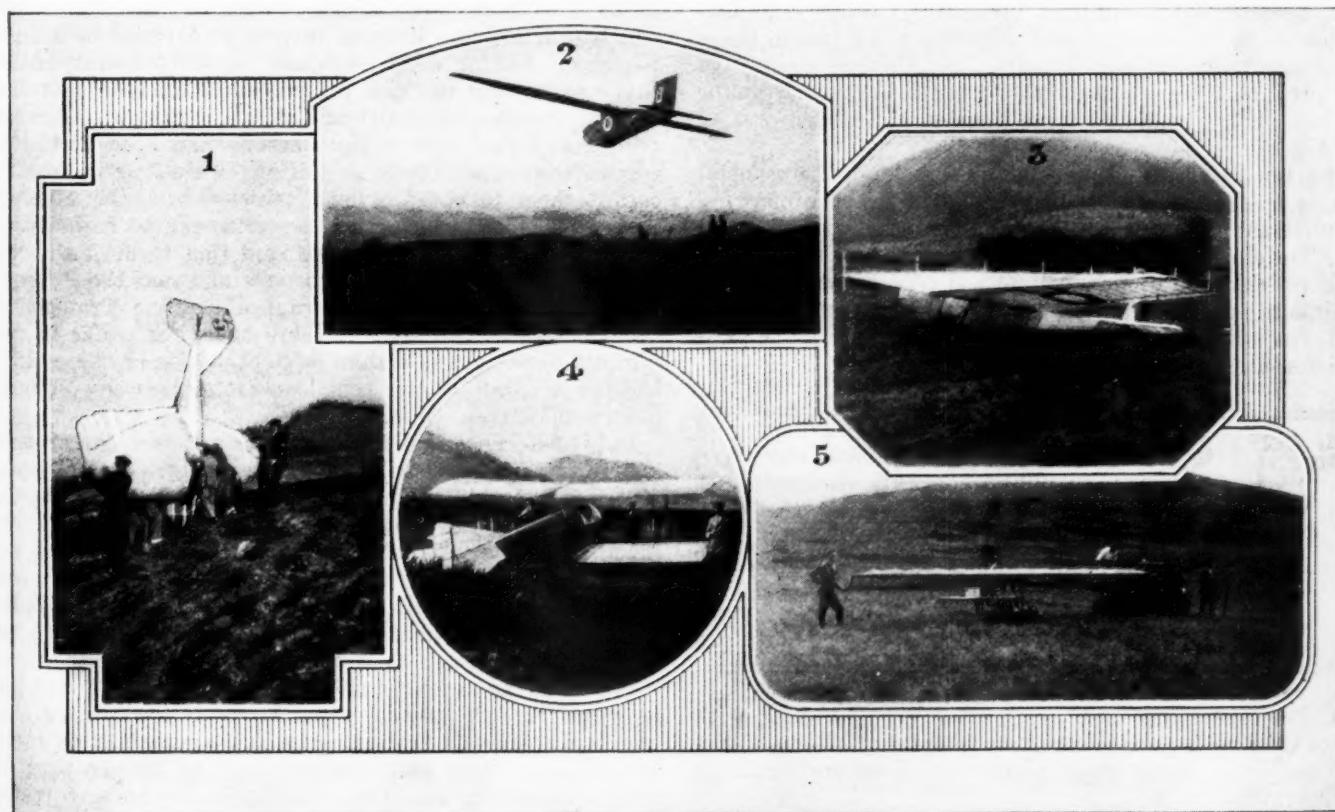
which flight can be maintained only by a highly skilled pilot and under favorable conditions. The power must be increased a little for safety and to allow for the increased weight, but it should still be possible to build a single-seater sport-plane on glider lines which will be safe and satisfactory for cross-country flying under reasonably good conditions and which will use much less power than has been supposed necessary up to the present time.

The production of such a machine based on glider practice has been under discussion in Germany for two years now, and Klemperer, holder of the glider duration record in 1920 and the first part of 1921, is planning to build and put on the market sport-planes with engines of only ten horsepower.

Low-Powered Planes Coming

The attempt to use the work done with gliders as the basis of the sport-plane of low power is likely to prove far more fruitful than effort directed toward the development of the aviette, or man-powered airplane. Even if it were possible to make real flights with the amount of power which an exceptionally athletic individual can furnish—and in the present state of the art of airplane design it is not—the building of an aviette would be little more than a futile stunt. Cross-country travel by bicycle long ago fell into disuse because it was so much easier to let an engine do the work than to do it for one's self, and the operation of an aviette would be a far more exhausting task than pedalling a bicycle along a road.

The aim should be not to eliminate the engine but to decrease its size and running costs. The glider helps to point the way.



1—Righting the Dewortine glider after a minor mishap. This machine, characterized by very light wings, now holds the French record with 21 minutes. 2—Darmstadt glider in flight. This machine made a record of 1 hr. 46 min. 3—Coupet's monoplane, a fine example of light construction. 4—Potez sport-plane reconstructed as a glider. 5—The American glider just before a flight

Electric Railways Begin to Favor Bus Transportation

Change of attitude toward motor bus feature of American Electric Railway Association Convention. Special committee drafting "Uniform Motor Vehicle Law" suggests heavy taxation and State control of public utility motor vehicles. Bus exhibits prove popular.

By Clyde Jennings
Managing Editor, Motor Age

CHICAGO, Oct. 5.

AN almost complete reversal of sentiment toward the motor bus marked the discussion on the report of the committee on Trackless Transportation of the American Electric Railway Association at its fourth annual convention at the Municipal Pier here to-day.

While the report of the Committee on Trackless Transportation is deemed a great advantage over any previous report on trackless transportation offered by this association, and was very satisfactory to the representatives of the automotive industry present, the next order on the program, a report of the Committee on Uniform Motor Vehicle Law, brought out a different viewpoint. While one committee of the association was welcoming the motor buses as allies in municipal transportation, another committee was preparing a report that would tax public utility motor vehicles off the road and force them to build highways of their own.

The report of the Committee on Trackless Transportation is quite friendly, as may be noted by the following conclusions:

1. The electric car on rails is, with minor exceptions, the most reliable and economical method now known for handling local passenger travel, especially mass transportation.
2. The automotive industry has developed a vehicle suitable for passenger transportation.

"IT is the duty of the electric railway companies, as public servants charged with the responsibility for conducting the highway transportation in our respective communities, to study and consider the availability of every feasible unit or method for furnishing this service."

3. The operating cost per passenger is higher with buses than with electric cars, but in spite of this handicap the bus is, in some cases, more economical for handling light traffic.

4. The public interest requires that the electric railways should be the sole passenger transportation agency in their respective communities; this makes for the cheapest transportation for the public; it also involves the duty of studying all available transportation methods.

5. Development of railless transportation by electric railways, if intelligently carried out, should not adversely affect the railways financially.

6. While a demand for a more expensive service for certain parts of the larger cities may be filled by the use of buses, their principal function is, and will be, as adjuncts to electric railway service.

7. Believing that railless transportation contains interesting possibilities for the electric railway industry, the further study of the subject by a committee of your association is recommended.

The discussion of this report was not very general. Zenas W. Carter of the White Company spoke at considerable length and was listened to very attentively by a large audience. Carter dealt especially on the demand of the public to be able to "ride on rubber." He said that this demand was the outgrowth of the use of the private motor vehicle and that now many persons had been forced to acknowledge that traffic conditions were too intense to permit them to operate their vehicles with the pleasure they would like to have and they still wanted to have the advantage of rubber tires. He said that to meet this demand the Deluxe bus had been built and that the Pennsylvania and Ohio and the Milwaukee Electric Transportation Companies had adopted these buses for traffic in certain districts. He said that on Sept. 30 six of these buses had operated at 100 per cent load factor between Youngstown and Warren, Ohio.

In his reference to different classes of buses Carter said: "I want you to visualize a new passenger traffic opportunity to the public, which offers a suitable service to the motor car owner who does not want to take his car down town, or to the wife of a motor car owner who does not care to drive a car in the dense traffic and who still wants comfort in her travels about the city. I want to predict here that within a year there will be 1000 of this type bus in use."

Carter spoke at length on the increase in traffic that had resulted from the use of motor buses as feeders for electric lines. He said that in many cases, especially on inter-urban lines, there had been as much as 40 per cent increase, especially was this notable in the holiday traffic. He, also, told the members of the association that within the last few days the U. S. Bus Transport Company had been incorporated in New York State and that behind this company was untold wealth of the steam traffic and amusement people. He said that one reason for the organizing

of this company was that the present public utility companies had not devised a means of bringing people to places of amusement under suitable conditions and that these men believe that the bus service would bring a much larger patronage to the down town stations and show houses in comfort and thus promote travel and at the same time make a profit.

The further discussions of this subject were chiefly in the form of questions directed to Carter and brief statements from some of the companies that operated buses.

The report of the special committee for drafting a "Uniform Motor Vehicle Law" was offered by C. D. Cass of Waterloo, Iowa. This report came in the form of a bill that was suggested to be offered to the various legislatures. Most of the bill is harmless enough and the real objection will come in the suggestion of taxes to be charged against motor vehicles operating as passenger and freight carriers. The plan is to place all public utility motor vehicles under the control of the State Railroad Commission or similar authority.

Cass spoke of these lines as "subsidized" in that they did not pay a sufficient tax to repair the destruction of the highways. He said that the committee had employed an engineer who had taken up the question of fees to be charged with a number of highway superintendents and that as a result they recommended the following:

Motor vehicles having pneumatic tires—one cent per ton mile of travel over and along the public highways.

Motor vehicles having hard rubber or solid tires—one and one-half cent per ton mile of travel over and along the public highways.

In figuring the ton miles of passenger travel, the maximum seating capacity of each passenger carrying motor vehicle unit (trailers to be included) at 150 pounds per passenger seat, plus the weight of the vehicle, multiplied by the number of miles operated (all divided by 2000), shall determine the ton miles of passenger travel per month.

In figuring the ton miles of freight travel, the maximum freight carrying capacity of each freight carrying truck or vehicle unit (trailers to be included), plus the weight of the vehicle, multiplied by the number of miles operated (all divided by 2000), shall determine the ton miles of freight travel per month.

He said that these figures were partially supported by recent investigations reported in the June issue of the Western Highway Building.

Bill Not Wholly Satisfactory

Some of the further conditions of the bill will be more or less unsatisfactory to promoters of motor vehicle transportation and the fact that the electric lines are inclined to write the detailed requirements for these operations will not find a very hardy support. Some of the things included in this bill, it would seem, might be left to persons more familiar with motor vehicle operations.

This report brought a very sharp though short discussion. One of the electric line men who operates six buses on a 15-mile road on a one-half hour schedule, said that the tax required in his business would be in excess of \$25,000 a year and this alone would more than pay the entire maintenance charge on this highway.

Another electrical man in speaking against the amount of the proposed tax said that the electric railway men should not lose their heads in the "fear, surprise, or wonder" at what these new vehicles were doing.

The more radical speaker advocated that there should be an addition to this road deterioration tax and there should be a tax on gross receipts to pay for the monopoly enjoyed by the company. The severity of these suggestions did not seem to be popular with the larger part of the

audience and it was not until one member moved that the report of this committee be adopted as an expression of the trend of the opinion of the association, that the discussion seemed near an end. This speaker said that to his mind he believed the figures suggested as a tax were not important. That the important part of the report was the basis on which a tax was to be levied and the pre-

THE special committee of the Association based its taxation proposal on the following:

"Inadequate taxation for the use of public highways by motor vehicle common carriers results in a public subsidy for such carriers. The problem of taxation represents the assessing of common carriers with such special tax as will compensate the public for the additional burden."

cautions taken to make the cost of such transportation fair to the tax paying public as well as to the passengers and the owners of the line. It was after this sort of an explanation that the report was adopted as read.

In commenting on this report after the adjournment of the session the automotive men and those electric railway men who are experienced in motor bus operation, said that at this rate of taxation the automotive transportation lines in many sections of the country could well afford to build their own highways. They, also, commented on the fact that this tax was computed on the full capacity of the vehicle on every trip.

Another interesting discussion of the motor vehicle as a competitor or an ally of the electric railway was in the paper read by Carl D. Jackson, of the Wisconsin Railway Commission, Madison, Wis., who was introduced as the leading economist on the electric railway situation. Jackson's subject was "The Real Interest of the Car Rider."

After a considerable discussion of unfair taxation on electric street railways, Jackson took up the matter of competition by motor vehicles. He said that the public had welcomed the "Jitney" and would-be bus, but had later learned that this competition had merely added to their own burden and he believes now the public sentiment had turned against competitive service. He saw, however, a very great future for the motor bus as an ally to the established public service transportation line and he thought that in most cases this automotive transportation should be under control of the electric lines, so that they might serve as a feeder in districts where transportation was poor, or that it might be placed at points where de luxe service was really required.

The men in charge of the automotive exhibits expressed considerable surprise at the interest shown in their transportation vehicles. It was notable that all of the buses on exhibition were of the single deck, one man operated, type. The exhibitors said that there was little inquiry concerning the double deck bus, or the bus that was necessary to have two men run it. The buses shown by the North Shore & Milwaukee line, which are used to maintain traffic to the main line from outlying points, and those built by the Chicago Elevated lines as feeders in certain parts of the city, attracted much attention and were examples of the progress being made by the motor bus in this particular direction.

In addition to the buses exhibited by Republic, Selden, Fageol, Ace, White and Garford, there was on exhibition a Mack gasoline track car. All of these attracted much attention and were among the busiest exhibition booths.

Heat Treating in Automotive Production

Convention of American Society for Steel Treating and American Drop Forge Institute discusses failure of airplane parts, heat treating in lead and other timely topics of automotive interest.

REASONS for the failure of airplane and engine parts, heat treating in lead, and the tendency to use the hardness test to indicate physical qualities of metals, were the chief topics of automotive interest discussed at the combined convention of the American Society for Steel Treating and the American Drop Forge Institute, held in Detroit, Oct. 2-7. The increased use of forgings and alloy steel by the automotive industry was reflected by the large number of automotive manufacturing men who attended these sessions.

The discussion of failures of airplane and engine parts brought out the fact that the greatest number of failures are probably due to improper heat treatment. J. B. Johnson and Samuel Daniels of the Material Section, Engineering Division, Air Service, pointed out in their paper on this subject that failures due to improper heat treatment "are caused by disregard for the laws commonly adhered to in scientific metallurgical control and neglect to accurately follow the specifications given." They pointed out, for example, that microscopic examination of a train of gears, which failed before the completion of the 50-hr. dynamometer run, disclosed a banded structure. This banded structure has been frequently observed in failed gears of this analysis (carbon 0.35, manganese 0.58, silicon 0.042, phosphorus 0.006). A micro-section taken of a broken propeller hub cap showed a coarse grained structure which was a very ready indication of improper heat treatment.

Causes of Failure

An important conclusion drawn from this discussion was the necessity for ample fillets in parts to lessen the danger of hardening cracks and the localization of the fatigue stresses.

Failures other than those due to heat treatment were discussed under two heads:

1. Failures traceable to raw material.
2. Failures traceable to poor machining or design.

Failures due to raw material are attributed to improper selection of material or to defective steel which generally results from improper procedure in melting, casting, cropping, chipping or other mill operations. Poor manufacturing practice leaves its trace commonly in the form of segregations, pipes, and seams which are transmitted from the ingot or billet to the fabricated sheet, bar or wire. Such defects decrease the available area of the stressed parts and act as starting points for cracks in quenching, or determine at least in part the direction of the path of cracks, especially in the part subjected to vibration.

A good example of the weakening influence of heavily segregated manganese sulphide is shown in a tachometer drive connection whose screw driver end was broken off in service. The steel contained 0.15 per cent carbon and 0.114 per cent of sulphur, corresponding in composition to the S.A.E. screw stock specification No. 1114. Examination of the sample indicated that the cracks followed the

boundaries of manganese sulphide inclusions, and that when these particles were in the path of the progressing crack, they became more or less completely dislodged, with resultant widening of the breach. The stress which caused the failure was mainly torsional.

Experimental Results

Another interesting failure described was that of a drop forged propeller blade. This showed the dangerous condition which results from the presence of a pipe in a forging billet. The propeller broke in a whirling test, although the stresses were not excessive. Another very interesting failure described is that of a valve which has been hand forged from S.A.E. W-60a (high tungsten) steel. The stem of this valve was snapped off in service at the neck of the tulip, revealing a very spongy core somewhat off-center. Two longitudinal sections were prepared so that the one included most of the spongy area and the other the sound portion. Upon microscopic investigation inclusions of undissolved carbides were located which furnished a clue to the cause of this fracture. The pipes practically closed up by the forging operation were also found in a stainless (S.A.E. 51230) high chrome steel valve. This valve was very unsound and snapped off abruptly at the neck while in service. The Air Service has also had considerable trouble with seams in chrome-vanadium steel wire used for valve springs. A transverse section of one of these wires revealed a seam whose width was one-third the diameter of the wire. A partial analysis of this material showed a carbon content of 0.48 per cent, chromium 1.02 per cent, vanadium 0.15 per cent.

Mechanical imperfections in the finished part such as tool marks, nicks and sharp corners, may also be the starting points of hardening cracks or fatigue failures. The finest grade of crucible steel may reach the scrap pile by way of poor methods of machining.

The discussion of heat treating in lead centered about the paper read by R. B. Schenck, metallurgical engineer of the Buick Motor Car Co. Basing his comments on specific automotive experience, Schenck made the point that lower costs result from the use of the lead pot in tempering work, but that for hardening work, the oven furnace is the cheaper. The greatest reason for using the lead pot, however, is the high quality of treated product resulting from uniform and accurate temperatures.

Schenck said in part:

"The lead pot furnace has, in recent years, been applied to volume production in steel treating with considerable success. While molten lead is far from being an ideal heating medium, it is the only metal which can be successfully employed for this purpose, and in comparison with the salts in commercial use as bath materials, it has the advantage of a much wider range of working temperature and a much higher heat conductivity. These two properties permit the use of lead in units of very large capacity for temperatures of 650 to 1700 deg. Fahr., thus covering

the hardening and tempering ranges of nearly all commercial steels.

"The selection of pot materials, the design of the pots and the brickwork and the method of firing are points of prime importance and must receive considerable attention if efficient operation is to be obtained. The unit should be built for the job it is intended to handle, bearing in mind at the same time the desirability of standardization.

"While some parts cannot be treated efficiently in lead, there are many which can be handled very successfully. Axle shafts, transmission gears and many smaller parts are now being hardened from lead pots, and a greater number are being tempered in lead. The lead furnace has its greatest range of usefulness for tempering operations, and many parts can be tempered in lead which cannot be efficiently quenched from this type of furnace.

"Comparing the lead pot with the oven furnace from the standpoint of operation cost, a great deal depends on the nature of the work handled, but in general, it can be stated that for hardening, the oven furnace is the cheap-

est of the two, and for tempering, the costs are slightly in favor of the lead pot.

"Taking everything into consideration, the greatest argument for the lead pot furnace is the high quality of the treated product resulting from uniform and accurate temperatures. It is very difficult, if not impossible, with an oven furnace to obtain the degree of uniformity which exists throughout a lead pot. Experience covering a period of years has proven, at least to the author's satisfaction, that where conditions permit of its use, the lead pot can produce consistently better work than any other form of heating unit."

A symposium on metallurgical education and hardness testing was held in connection with the convention to promote the possibilities of conference and co-operation between metallurgical engineers and teachers of metallurgy. The discussion brought out the fact that there is need for revision in many of the courses now given if the students individually, and industry as a whole, are to reap the maximum benefit from the training given.

Chevrolet Has Many Body and Chassis Changes

A NEW model Chevrolet Superior made its first appearance on Oct. 8, and at the same time notice was given of the discontinuation of the FB line. While the car in general is much the same as before there are a great many refinements in design of both the body and chassis. Prices remain unchanged.

The most noticeable changes are in the design of the bodies, hood and fenders. The radiator has been made $4\frac{3}{8}$ in. higher and $1\frac{3}{4}$ in. narrower, and its capacity has been increased. The radiator shell has been changed so that the top corners are more square. The hood is higher and the curve has been taken out of the cowl, giving practically a straight line from the radiator to the windshield.

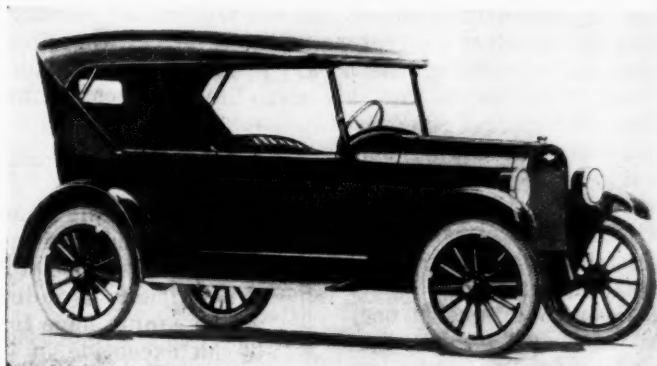
The fenders are of the crowned panel type and the shape has been changed to conform to the new body lines. The metal in both fenders and bodies is being made of heavier gage and the entire redesign has been carried out with the idea of eliminating vibration and rattle that might result from weak parts.

Headlamps are of the drum type and are now fastened directly to the fenders. The windshield has been given a greater angle and the lower glass on the open models pivots at a point more nearly at the center of the glass than in the previous models, which pivoted near the top. Sun visors of black metal are fitted on all closed models.

The instrument board is now finished in enamel instead of the dull finish previously used. The wood backing to the instrument board has been eliminated. Appearance of the car from the rear is considerably altered. The two small oval windows used in the open models have been changed to a single oblong plate glass window. The change from gravity to vacuum fuel feed system has placed the gasoline tank at the rear on all models. Previously only the sedan was so arranged.

The upholstery is now made of Fabrikoid of a finer texture than used before.

A number of important changes have been made throughout the chassis. The frame is made much stronger to prevent weaving. The channels are of heavier section and the cross braces are also heavier. Both front and rear springs have been entirely redesigned, the method of fastening to the chassis being by means of a pocket anchor. The springs are still quarter elliptic but are now single curved downward



New Chevrolet Superior touring car

instead of double curved, necessitating more clearance between body and axle, which has been provided for by raising the rear of the car. This change of curve permits taking road shocks more nearly in the center line of the spring. The number of spring leaves has been increased and the leaves themselves are larger.

Wheel hubs have been increased slightly in size for greater strength and better appearance. The steering gear is now of the worm and screw type, instead of the planetary type used on the older models.

The gearset has been changed slightly, especially in the gear shifting mechanism to prevent rattles. The position of the emergency brake lever has been changed from the side to the back of the gearshift lever, the latter having been moved forward 6 in. and bent so that the driver's hand will not touch the dash. The latch on the emergency brake lever is now of the spring and handle type instead of the button type.

A CG vacuum fuel feed is used on all Superior models except the sedan, which retains the Stewart vacuum system. The Holley carburetor will be used on part of the line, Zenith, which was used before, being used on the balance. This is done to provide two sources of supply for increased production. The same practice has been followed with the ignition, which is either Remy or Auto Lite.

The only change that is made in the engine itself is the increase in weight of the flywheel, to make a smoother running engine.

Business Books an Aid to Supervision of Men and Material

Recent publications deal with psychological as well as analytical study of business procedure. Growth in use of charts gives rise to two works on subject. Study of factory stores keeping appears.

MANY interesting books on subjects pertaining to business have appeared recently and cannot fail to give material of value to those who dip into them. It is our intention to tell you where some of this material lies and talk a bit about them.

A few weeks ago we said that we weren't at all sure that "Our Unconscious Mind" had anything in it of value to automobile executives. We have recently reassured ourselves on that point, however, by the simple process of reading the book. It is worth while for anybody who has to live his own life and come into contact with others. So there aren't many excluded. . . . The diagrams of our mental actions and the ominous looking captions attached are not fairly representative of the text matter. . . .

We got so interested one time we turned back to the cover to make sure we weren't reading a Craig Kennedy story. . . . The book covers so wide a range that we can't describe its contents very well in brief. The best thing to do is to read it. . . . The first part of the volume is more interesting and fundamentally more useful than the latter part, although the last chapters deal with the new psychology in advertising and salesmanship and speak directly about automobiles. . . .

This study gives one a somewhat new conception of the reasons for the actions of certain people of business or personal acquaintance; to make one better able to understand those with whom he works; and consequently more capable of handling them effectively and intelligently. . . . The book also tells you how to raise your children. . . .

The chapter on advertising has one specially interesting example taken from the automobile field. . . . "Many a campaign is handicapped at the outset," Pierce says, "by a name which arouses unguessed resistances. I have been able to conduct extensive association experiments along this line, and the results are sufficiently conclusive to indicate that thousands of manufacturers are unwittingly encountering tremendous buying resistance through unfortunate associations with the trade-mark names of their featured products. . . .

"The name of a certain automobile. Among the many associations which came up, three out of eight people

thought of a notorious and revolting criminal case. Two others thought at once of a slang word, sounding much like the name of the car, which is a common term of belittlement and contempt. The car, though splendidly made, has never become widely popular." . . . Wonder what the car was? What do you think? . . . Anyhow, as Bill Shakespeare said, "What's in a name?" Quite a bit in some cases, it would seem.

* * *

WE think it's safe to say that if you want to know anything about pneumatic tires you can find it in

the very large volume, "Pneumatic Tires," written by Henry C. Pearson, the editor of the *India Rubber World*, and published by the India Rubber Publishing Co., New York. If you don't find all the information you seek you will at least find a reference which will probably suffice.

The tire business has grown to such enormous size, with its concomitant numberless inventions and processes, that it is a feat to get such a vast amount of information into one volume without obvious cutting and all intensely readable.

Different processes of manufacture, and that means from the mixing of the crude rubber to the finished, wrapped product, are described and illustrated with obvious care.

As a source book; work of general information; as a text book for specific information or reading matter for anyone interested in any phase of the rubber tire industry, this volume is recommended. It's size is forbidding, and, to be honest, we hesitated to pick it up, but we also hesitated to set it down.

* * *

ONE difficulty facing those whose duty it is to supervise the work in the factory and who are responsible for the operations in connection with diversified machinery in departments, is the matter of proper records showing the work done, the time lost, the reasons for the difficulties and the efficiency of the individual operation, as well as the departmental conditions. Many systems of records are used in the endeavor to simplify them and, at the same time, permit the exhibition of the true condition so that it may be seen readily and easily.

"The Gantt Chart," by Wallace Clark, deals with the use of the Gantt Chart for these various purposes; its uses

MANY publications of great value to the automotive executive appear from time to time. As close studies of problems in the sub-divisions of industry they offer material which cannot hope to be thoroughly acquired by an executive in the course of every-day business routine.

It takes valued time to keep in touch with all the new books, hence we aim to lay before you a brief talk on those works which seem to us to be most applicable to the needs of the automotive executive, whatever his particular work may be.

are explained very simply—the method of preparation and adoption for different purposes are stated very clearly and concisely, so that no great amount of technical knowledge is necessary to an understanding of their value and applicability. The charts themselves are capable of expressing a great many factors very clearly and very simply, so that they may be read without difficulty.

Those benefits numbering from 7 to 13 which are claimed for these charts can be qualified by the statement that the benefits arising out of intelligent, fair and just management can be amplified and made more easily visible by the use of simple systems of charts which are easily understood, as the Gantt Charts are.

The book should be of great value to those who are engaged in handling operations and in supervising the work of a number of individuals, whether this work is in the shop or the office. Its publisher is the Ronald Press Co., New York.

The clarity of the writing and the diversity of the applications used as illustrations in the book make the work of much wider value than the usual discussion on engineering analysis, and suggest the possibilities of the application of the method to any of the activities of business supervision.

* * *

ALMOST every concern of any size uses graphic charts to a greater or less degree, and if the charts have been drawn with forethought they have probably proved very valuable. Once charts have shown their value the use of them grows and the ability to get the best out of them grows alike.

Sales executives are prone to use charts to show volume of sales, and all business executives can find them of great assistance in telling them what they want to know with the least possible expenditure of time and with the least mental effort. Not only do graphic charts convey facts with rapidity, but they have the power of conveying these facts so that they stick.

"Graphic Charts in Business," by Allan C. Haskell, shows how to make and use them. As there are several kinds of charts that may be used, each being particularly well suited for a specific purpose, much valuable information can be obtained from this work, which ably explains the "Hows" and the "Whys," which arise in everyday business procedure.

Mathematics has been avoided and explanations are clarified by actual illustrations, so that it is easy to obtain necessary information without "wading." This immediately puts it in the readable class of books.

While there are no hard and fast rules about the making of graphic charts, there are certain things of prime importance that must be followed if the chart is to portray correctly the facts that it is supposed to show, and these instructions and cautions against pitfalls are concisely given.

The busy executive who wishes to have the progress of his organization at all times at his finger tips will probably use charts and thereby prolong the span of his life. We think that it will add a few more years if he knows that those same charts are accurate and knows how to interpret them. We believe that this little volume will greatly aid in its achievement. The Codex Book Co., New York, is the publisher.

* * *

"FACTORY STORESKEEPING" would appear from the title to be a work that would appeal to the factory executive and it will, we think, prove so. Mr. Farquhar bases his book on the idea that one of the most important factors in manufacturing is that of handling material and he goes into the question thoroughly, giving a very complete analysis of the entire field. McGraw-Hill Book Co., New York, is the publisher.

"The tendency in the best plans to-day is to look upon the control of material as a production function and to govern the replenishment of materials in accordance with the requirements of production during a reasonable future period." Farquhar shows how this should be done and illustrates the system to be employed.

Emphasis is laid on two topics which the author believes do not receive merely the attention which is due them, but which are none the less of vital importance. These two topics are: Determination of Quantity, or the question of ascertaining and regulating how much and when to buy various materials under different conditions, and Methods of Administrative Control, or the measures by which the whole material cycle is brought under systematic operation.

Incidentally we think the above paragraph shows in a measure the scope of the work and the worth-while nature of the material to any factory executive.

Foreign Commerce Handbook of Value to Exporters

FOREIGN COMMERCE HANDBOOK is the title of a booklet just published by the foreign trade department of the Chamber of Commerce of the United States, which should serve as a reference of value to the exporters of automotive equipment. It is not a compendium, as so many publications of its kind seek to be, but a reference work telling exporters where they may obtain information on a great variety of subjects pertaining to overseas selling.

A few typical reference headings are Letters of Credit, Documents in Foreign Trade, Legal Assistance, Ocean Shipping, Trade Marks, Harbor Charges, etc. The Chamber of Commerce, through its foreign trade section, is doing much to foster the American effort to develop overseas markets but it is to be regretted that automotive equipment is not considered by the Chamber in a more detailed manner.

Although automobiles and the attendant equipment fur-

nish one of the most important branches of American industry in the great markets of the world, the Chamber has not named on its foreign trade committee even one representative of the industry.

Motorcycle Market Around Vigo, Spain

THERE is a moderately good market for motorcycles in the Vigo district. There are hardly more than 20 machines in the district at the present time, as the market has never been developed. A good market will be found all through Spain and with distributors at Barcelona, Madrid, Seville and Bilbao, a moderate demand would be developed after allowing a year or so for the purpose of introducing individual makes.—(Vice-Consul C. Austin Castle, Vigo, Aug. 7.) Trade letter to Martin C. Van der Wal, New York City.



The FORUM



Effect of Cylinder Pressure on Oil Pumping

Editor, AUTOMOTIVE INDUSTRIES:

A. Ludlow Clayden, in the Forum of AUTOMOTIVE INDUSTRIES, issue of August 17, apparently assumes with Ricardo, that the pressure in the cylinder over a range from a considerable plus to a considerable minus has no effect at all on the quantity of oil consumed. Whether or not the depression in the cylinder affects the oil consumption is entirely dependent on the condition of cylinder, piston and rings. Having these elements nicely, and by that I mean accurately, matched, vacuum will have no effect on the quantity of oil consumed. Atmospheric air tends to maintain a uniform pressure in all directions; therefore, if we have a given depression in the cylinder we will have a corresponding pressure at the throttle and at the rings; oil trapped between the cylinder and piston walls will be forced toward the point of depression in proportion to the size of the passage through the rings, the quantity of oil supplied and the degree of cylinder depression. Many an engine when idling will throw out a fog of oil smoke but when pulling hard will not smoke at all, these conditions represent the maximum extremes.

Much ingenuity has been expended in developing rings to overcome this condition. It being recognized that if a ring capable of forming a perfect seal could be devised the problem would be solved. Given a ring that would exert a uniform circumferential pressure, and a constant lateral pressure in the groove, with a joint closed both vertically and horizontally, the difficulty would be solved. Rings, though, are subject to rapid wear which increases with piston speed, so a ring not having a wide range of expansion, would be no better than the conventional type.

I had occasion two years ago to remove the block of a six which had been fitted with rings of two piece construction. Of the eighteen rings installed, I could find enough whole segments to assemble three rings. This, together with other experiences with multiple piece rings, leads me to believe that such rings are too delicate to be used with the usual groove widths.

Mr. Clayden's statement that the oil is mostly burnt up when the engine is pulling hard is questionable, for by that I suppose he means that just as much oil is drawn up into the combustion chamber when pulling as when idling. If it were so, an engine would smoke as much when pulling as when idling, which they do not do. Assuming that he is right, the quantity of oil reaching the firing chamber would increase with the speed of the engine, with the consequent fouling of the plugs at the higher speeds, whereas a characteristic oil pumper is most troublesome at the lower speeds.

Mr. Bull, in his summer meeting paper, mentions an engine remarkable for its economy at low speeds, apparent economy would be the better wording, as oil used was compensated for by dilution, the excessive consumption at high speeds was no doubt due to high crankcase pressure

caused by the rapidity of the flow-by and the inability of the breather facilities to care for it. The effect being similar to that caused by depression in an idling engine.

Oil pumping is common with all systems of lubrication, it simply being a case of over-oiling. On fairly level roads or slight grades some engines will give no trouble at all, but, in hilly regions, after descending grades the forward plug will foul and occasionally the second. In these engines no provision has been made to prevent oil surging in the crankcase, resulting in the first cylinder being flooded with oil when descending grades and the rear when ascending. On examining the carbon deposit, that on the rear piston will be different not at all from that on the center ones, while that on the first will be decidedly oily. Therefore, if cylinder depression has no effect on oil consumption how does it happen that the forward cylinder so often pumps oil, and granting that oil reaching the rear cylinder is burnt up, due to the higher heat when pulling, why is it the carbon deposit is no oilier than the center cylinders?

ARTHUR LA FOUNTAIN.

Distributing Cars to Sweden Through Copenhagen

Editor, AUTOMOTIVE INDUSTRIES:

In receipt of your AUTOMOTIVE INDUSTRIES of August 10, and I am very much surprised over Mr. E. C. Petrie's article stating that Copenhagen is supposed to be the distributing center for Sweden for automobiles, as it is perfectly misleading. This is easily shown in your statistical Export of Passenger Cars and Trucks. American export firms never will do any business in Sweden if they are looking upon Copenhagen as the headpoint.

Yours very truly,

SVEN GRUNDIN,
Ex-Automobile Salesman in Sweden.

Editor, AUTOMOTIVE INDUSTRIES:

Replying to Mr. Sven Grundin's criticism of my Denmark article, I regret that he took my statement that Copenhagen was the distribution center for Scandinavian and Baltic countries in an absolute automotive sense. Such was not my intention, and a re-perusal of the paragraph will reveal this. As Mr. Grundin suggests, it is absurd to declare that the whole of the motor vehicles passing into, not only Sweden, but all the other countries enumerated, do so through Copenhagen. The very magnitude of the figures, pursued so far, defeats this contention.

Nevertheless, a large number of American cars did enter Sweden from Denmark in 1921. According to your Statistical Number, 920 passenger cars and 64 trucks entered Sweden last year direct from the United States. According to the Swedish "Kommerciella Meddelanden," 4637 passenger cars and 1109 trucks were imported into that country in 1921. As the great disparity in these figures cannot be accounted for by the imports from other manufacturing countries, whence came they? The answer is to be found in a recent report issued by Mr. H. Kershaw, the British Commercial Secretary at Stockholm, in which he states that large quantities of American cars were re-exported from Denmark in 1921, chiefly to be distributed among the farmers in South Sweden.

I certainly agree with Mr. Grundin that a country absorbing thousands of motor vehicles yearly should have direct representation from American exporters, but I still insist that a central distributing point established for Northern Europe would provide a marketing advantage, whether it be in Christiania, Stockholm, Gothenburg, or Copenhagen. I am supported by no less an authority than Commercial Attache N. L. Anderson when I suggest that the Danish capital, as the principal commercial center of Scandinavian and Baltic countries, is best suited to be the main service station for this area.

E. C. PETRIE.

Methods of Fractional Distillation

Editor, AUTOMOTIVE INDUSTRIES:

It would require too much space to discuss Mr. Tice's interesting article on fractional distillation in detail, but I would like to make the following observations:

Mr. Tice's discussion of the theory of distillation and the mechanism of fractionation is, on the whole, very good, although he does not call attention to the importance of regulating the ratio between the amount of reflux down the tower and the amount of vapor coming up, which is really the most important factor in determining the efficiency of fractionation in a given tower. This can be controlled fairly well by accurate control of still head temperatures, or by several other methods. The greater the ratio returned the closer the fractionation, but the lower the capacity of the tower.

Throughout the article, however, Mr. Tice loses no opportunity to discredit the present standard distillation test and to recommend the adoption, even for routine tests, of a much more complicated method which he has developed. In this recommendation I certainly cannot concur. For certain research purposes it may indeed be desirable to know just exactly what constituents are present in a fuel, but the purpose for which we need the standard routine test is to measure the *effective volatility* of a given fuel, regardless of the precise compounds present—in other words, we need to *integrate*, rather than *differentiate*, the present distillation curve, which gives too many points. In reality only *two* figures are needed—one as a measure of the effective volatility from the standpoint of complete vaporization and distribution in the manifold, and one as a measure of the effective starting volatility. Our laboratory has already shown how to determine the first point* and has outlined a possible method of determining the

second.** Our work has also indicated that both these two figures can be approximated by taking two points from the ordinary Engler distillation curve (85 and 30 per cent points, respectively), but it would be hopeless to get such data from the fractionated runs made by Mr. Tice.

In other words, for routine testing purposes, it is a matter of no concern whether the initial point is within a hundred degrees of the true initial, providing it gives two figures which are proportional to the effective volatility of the fuel from the two above mentioned standpoints. It is important, however, that the apparatus be simple and not too expensive, that the manipulation and precautions to be observed be not so complicated but that the average routine laboratory men can get reproducible results. The contrast between the excessive cost and complication of Mr. Tice's apparatus and method of recording data and the simple Engler set-up is too obvious to require comment, to say nothing of the question as to what use can possibly be made of all the detailed data after they have been obtained, except for very special research work.

Mr. Tice's statement that two men using identical apparatus cannot consistently check each other by the present standard distillation test depends, of course, on what is defined as a "check," but it is certainly not true as far as entirely satisfactory agreement between different men or different laboratories is concerned, as evidenced by the results obtained by Committee D-2 of the American Society for Testing Materials and a large number of different oil laboratories. The initial point may not check within several degrees, but the deviation over the important portion of the curve is negligibly small.

Mr. Tice's conclusion that a reasonably exact knowledge of initial points and percentages over below 40 deg. C. is of great importance in comparing gasolines for winter use, is incorrect as shown in the paper previously cited.**

Mr. Tice appears to be seriously concerned because the initial point in the distillation test does not represent the true boiling point of the constituents present, and yet it appears that even in his special apparatus for accurate fractionation, the butane comes over between 10 deg. and 14 deg. C., whereas it actually boils at 1 deg. C. A large correction must be made in any case, in order to calculate the temperatures of partial or complete vaporization when mixed with large volumes of air, so that it matters little what precise temperatures are obtained by a testing method, so long as they are *reproducible*, and *proportional* to the effective volatility of the fuel.

ROBERT E. WILSON, Director,

Research Laboratory of Applied Chemistry, Massachusetts Institute of Technology.

All-Purpose Farm Body Popular with Farmers

THIRTY-three per cent of the farmers interviewed in a recent questionnaire sent out by the Republic Truck Co. expressed their preference for the all-purpose farm body type of truck, as the one best suited for their general needs on the farm.

Twenty-five per cent expressed a preference for the box type of body, 22 per cent for the express type and 20 per cent for the rack type of body.

*Robert E. Wilson and Daniel P. Barnard 4th, S. A. E. Journal, November 1921, vol. IX, No. 5, p. 313.

**Robert E. Wilson, S. A. E. Journal, January 1922, vol. X, No. 1, p. 6.

Use of Statistics Entails Knowledge of Their Source

Widespread use of motor vehicle registration figures requires that manufacturers guard against inaccuracies. Divergence of licensing methods permits fatal errors when dealing with small number of units. Subdivided figures from totals often misinform.

By Harry Tipper

THE use of statistics in the laying out of market plans has become general and this method represents a considerable advance over the guess method previously employed. The widespread use of the general statistics brings up the question of how these can be used without misleading the individual manufacturer in his calculations, because of the differences in their methods of collection and their compilation.

The larger mass of individual units contained in general tabulations, provides a curve or chart in which the probable error becomes smaller and of less consequence. Subdivisions from this general calculation present possibilities of error much larger than the original tabulation itself. Where the method of arriving at the subdivisions must be by subtraction or sampling and estimate arranged in percentage of the totals, the error is likely to be larger and of more consequence.

This can be applied to the automotive field in connection with the use of the general and State registration figures as the basis for other calculations. These registration statistics are not entirely accurate in themselves. The methods of registration employed by the different States do not agree in all particulars. They agree in many more particulars than they did in past years. Each year has seen the development of a greater degree of similarity in the methods used in the different areas. Even to-day, however, the differences are not completely wiped out and they have their effect on the accuracy with which the tabulations can be effectively analyzed.

Some years ago a number of the States had no regular method of State license, registration was by county and there was no regular method of registration in many of these counties. When the more important States began to separate commercial vehicles from passenger car registrations the methods of determining a commercial vehicle varied very greatly. Only gradually did the States accumulate statistics separating these two. A number of them still present statistics in which there is no differentiation between the one and the other type of vehicle.

The methods of determining to which class a vehicle belongs, still vary sufficiently to have some effect on the totals secured. It is not possible to get figures from State registration which can be regarded as thoroughly accurate in the subdivision of commercial and passenger vehicles. When an attempt is made to again subdivide the commercial vehicles so as to secure some idea of the number

of light delivery trucks and trucks of larger sizes, the difficulty of securing accurate facts becomes greater.

In view of the arrangements by which the registrations are tabulated in the various State offices, statistics have been secured by the examination and tabulation of the individual particulars of each registration. Again, however, the methods of securing information, which will permit the issue of a license, vary in the different parts of the country, so that the information secured is not the same and cannot be tabulated with any ease or without a probable error.

These probable errors are of no great importance so long as the statistics are concerned only with the general totals for the country or the general groupings for the country. A probable error of five hundred thousand vehicles registered in 1921 would mean only an error of 5 per cent—which is not important in considering either tendencies or immediate futures in total volume.

This total error has been decreasing each year, as the methods of registration became more uniform. If anything, this error would tend to show the curve of registration as rising a little more rapidly than the actual condition of use, because the totals from the registration figures will more nearly represent the total ownership of vehicles as the methods become standardized and the enforcement more regular. Any such error, however, is negligible in the general calculations, because the large number of units dealt with tends to reduce the difference so that it has no effect upon the curve.

It is possible to project these calculations into the future for some years using the predicted volumes, without any great speculation. A slight percentage of decreasing error will not affect the results sufficiently to put the predictions in the category of speculation.

The curve of registration growth used in the Nov. 17 issue of *Automotive Industries*, 1921, can be used by any manufacturer for his general basis, because of this condition. It is not safe to assume, however, that because these general figures can be safely used, the subdivided figures can be used without further critical analysis and a much more limited prediction as to the future.

Readers of *AUTOMOTIVE INDUSTRIES* will have noticed that the articles dealing with the price groups and their

past development were limited to the immediate future and were not developed to the extent undertaken in the consideration of the general registration. The only way in which the price groupings can be successfully determined is through the statistics of production. The probable error in the production curve is less than the probable error in the registration curve and as a consequence it has been possible to arrange the growth of various price groups with considerable accuracy.

Changes can occur in prices, which would affect these groupings so that a curve projected beyond a limited future would be misleading, particularly in a period of more or less rapid fundamental price alterations. For the limited period of one to three years these calculations are sufficiently accurate to enable the manufacturer to proceed on the basis of the figures, assuming that he possess sufficient experience to determine his own relative position with other units in his price market.

The greatest difficulty in working from the general statistics is shown in the attempt to coordinate the commercial vehicle registration, the production figures on trucks and the production figures on passenger cars.

It is obvious that an error in registration figures of five per cent, or approximately five hundred thousand vehicles, while it would be of little bearing on a total of ten million or more, would be of very considerable importance in the estimated registration of one million, two hundred thousand trucks; if the error was found to be more or less directly affected by the difference in the commercial vehicle registration methods. In that case the truck figures would be altered by the total of almost fifty per cent and any calculations based upon the accepted figures from registrations would be entirely misleading.

That there is a considerable error in the commercial vehicle figures is evidenced by differences established in some years by using two methods of arriving at them. For instance, in several years the passenger car registration figures, the commercial vehicle registration for that year, and the total statistics for the year, do not agree. The accumulated production figures do not agree with the totals of use, even with every allowance for the junk pile. These differences are small and unimportant in respect of the total registrations or passenger car registrations, but they are too big to be omitted from any analysis of the commercial vehicle situation and must affect any calculations which are to be used as bases for marketing plans by the manufacturer of commercial vehicles.

It is obvious that the commercial figures for many of the States a few years ago were too low and the passenger car figures too high, because these States did not make any thorough differentiation between the two. It is obvious that figures to be obtained to-day are indicative rather than accurate, as there are still a number of States that do not make any difference in registration and some of the others do so on a solid and pneumatic tire basis and not on the actual use.

In an attempt to analyze the commercial vehicle situation through the available statistics, use was made of various sources, to deal with the number of sizes and types of such vehicles in use, in various States and industries. Here again the discrepancies between the subdivided figures and the totals present grave difficulties and make it impossible to suggest the use of any of these subdivided statistics in any way other than as a probable indication of the relative position of the market and not as an accurate conception of the size of the market.

For the passenger car manufacturer statistics of a reliable kind, showing the growth of use in

the various states, the growth and position in the price classes and careful analysis of present and immediate future conditions in the various territories, comprise a basis for marketing plans almost without any further detail; except those pertaining to his own business and his own experience. In the commercial vehicle business, however, the requirements are more severe.

To secure a proper basis for future policy in this field the manufacturer should know the growth in the use of commercial vehicles. The relative growth of vehicles on passenger chassis and those designed especially for freight purposes, the relative use in various sizes and in various industries, or distinct portions of the market.

All these matters represent at present slim possibilities of analysis in view of the error in the total statistics, the discrepancies in the subdivisions and the impossibility of harmonizing the differences.

Most statistics are presented without a sufficient explanation of the sources or the methods of compilation. This makes it difficult for the manufacturer to determine the value of the figures presented or to check them from his own experience.

The use of statistics and statistical analysis as a basis for marketing and production plans is a very great advance. The most important step is in the analysis of the statistics secured; so that their accuracy, value and applicability are understood.

It is unwise for the manufacturer to accept statistics without question, unless the sources are thoroughly known and the methods of determination are explained. Particularly is this the case with the subdivided figures relating to the various small groupings within the field; in which the probable error may be of great consequence.

New Rustproofing Process

CADMIUM salts are being employed in a new rustproofing process which is being recommended particularly for automotive parts. It is claimed that with this process, which consists of electro-plating iron or steel articles with a thin coating of cadmium, the rustproofing coat will vary from .0001 in. to .001 in. in thickness. It is also claimed that with this process articles such as precision screws can be processed without destroying the accuracy of their fit when the tolerance is over .0002 in. The process is that of electroplating and requires from 1 to 10 min. for the operation, according to the Udylyte Process Co. of Kokomo, Ind.

The article is then baked from 2 to 3 hr. in a temperature of 300 to 400 deg. Fahr., which is said to cause the cadmium to penetrate the iron and form an alloy to be unusually resistant to atmospheric corrosion. Samples have been tested by the Bureau of Standards, according to the owners of the process, and it is claimed that results superior to the hot or cold galvanizing methods are secured. In appearance, the deposit is a flat white, although, if desired, a bright deposit may be secured. The color is very nearly that of silver and is said to be readily brought out. Articles which have been Udylyted may be refinished by depositing copper, nickel, silver, gold, etc., over the coating. An estimate of the cost of the process made by the Udylyte Co. indicates that the figure should not be in excess of 2½ cents per lb. It is claimed that 1 lb. of cadmium salts will cover 134 sq. ft. of surface to a thickness of .0002 in. The cost of the 200 gal. solution is about \$250.

AUTOMOTIVE INDUSTRIES

AUTOMOBILE

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Make It Plain

MISUNDERSTANDING is often generated in business relationships simply through inaccuracy of statement.

Nearly every day some cases arise in one phase or another of the automotive industry, where a hasty, inaccurate statement results in the giving of a wrong impression, a consequent growth of misunderstanding and lowering of business efficiency. We got a letter the other day, for example, the first sentence of which read something like this:

"We are entirely out of sympathy with an article which recently appeared in your magazine."

The following sentence then stated that the article had some very good statements concerning certain features of the subject involved. A close analysis of the letter indicated that the writer of the letter was about 40 per cent in sympathy with the writer of the

article and about 60 per cent out of sympathy with him. The letter writer in his first sentence had made a misstatement of his own opinion.

Accuracy of expression in business writing and talking is essential to efficient operation. The employer communicating with his employees, the seller communicating with his prospective buyers, the manufacturer communicating with his dealers and distributors all run the risk of giving the other fellow an inaccurate impression of what is really in the writer's mind. Giving such wrong impressions is the cause of more business difficulties and friction than is commonly realized. Writing is more subject to such misinterpretations than talking because of the comparative lack of personality in the former. In both forms of business communication a definite effort to "say what you mean" is well worth while.

Conditions Which Cause Wheel Wobble

THE question raised in our recent editorial "What Makes 'Em Shimmy?" appears to have found a satisfactory answer in the instructive article on "Wheel Wobble and Other Steering System Faults," which appeared in AUTOMOTIVE INDUSTRIES of Oct. 5. The answer can be briefly summarized as follows:

When steering knuckle pivots are inclined either in a fore and aft or in a transverse, vertical plane motion of the wheels out of the straight ahead position tends to raise one side and lower the other side of the chassis and thus deflect the front springs. Conversely, deflecting the front springs of the same car in a similar manner tends to move the wheel spindles and thus move the wheels.

If, then, the car passes over a wavy road surface which alternately deflects the two front springs the wheels are deflected with alternate right and left impulses which causes them to wobble and the car to "shimmy." The action is cumulative and becomes violent at a certain frequency of impulse corresponding to the natural period of the springs and the parts connected to them.

That this conclusion is correct or at least exceedingly plausible is indicated by the fact that wobble has, in every case brought to our notice, been stopped either by changing the inclination of the knuckle pivots or by increasing in some way the friction at steering system joints. In the latter case the friction tends to damp out the oscillation, while in the former the wheel spindle motion due to the kind of spring action which produces wobble is reduced until it becomes zero, when the axis of the steering knuckle becomes truly vertical.

The other points raised and the fallacies referred to in the article in question should serve to point the way in overcoming certain faults which are all too prevalent in the steering systems of the average car and truck of to-day.

International Automotive Conferences

WE have received from our British correspondent the following suggestion which, we believe, merits the careful consideration of the entire automotive industry. International conferences, even in the automotive field, are not a new thing. Engineers on both sides of the Atlantic recall with great satisfaction their highly profitable visits across the pond before the war. There appears to be no reason to question the value which would accrue from similar conferences of executives as well. Annual conferences of the kind proposed may not be feasible at present, but the idea is sound and worth thinking about.

IT is probably safe to assert that every year there is a greater passing to and fro across the Atlantic of representatives from both the engineering and merchandising sides of European and American automotive plants. The object of these trips in most cases is to study the current conditions on the other continent; to visit plants and observe directly and personally the trend of development and tendencies in design, manufacturing methods and sales prospects. At the show period each year in London we cannot fail to note large numbers of visitors from the States, and we know that many members of the British industry arrange for representatives to visit the New York show or else send them or go themselves on tours of inspection in the United States at other times of the year.

But all these international visits are private and unofficial in character; there is nothing in the way of conferences between representative bodies of the two continents. As a result there must be waste of energy and a lack of mutual advantage which might follow were the conditions otherwise. It has therefore been suggested privately in England that the Society of Automotive Engineers and the British Institution of Automobile Engineers should be brought together or come together and organize, say, annual conferences, alternately in America and in England. Possibly French, Italian and German representatives might be brought in. Although the language question would cause difficulties and complications they would not be insuperable. The S. A. E. and the I. A. E. might work in conjunction with the National Automobile Chamber of Commerce on the one side and the Society of Motor Manufacturers and Traders on the other side.

The principal items of the program of such organized visits would be (1) the reading of papers, with discussions, covering both technical and merchandising matters and dealing sectionally with specialized subjects pertaining to passenger cars, trucks, motor cycles, tractors, aircraft, fuel, legislation, etc., (2) collective and individual visits to automotive and accessory plants and (3) visits to the national shows.

THE interchange of views and experiences thus rendered possible in organized form would surely be of benefit to the industries on both sides of the Atlantic. Surely neither the Americans nor the British concerned will claim the sole prerogative of brains and ideas; each side must have something to learn from the other in different spheres perhaps. Co-operation in an endeavor to further the interests of the automotive movement in general would certainly do no harm; even if it were carried no further than discussions on the all-important question of suitable fuels and the best way of utilizing them, it would be of great advantage.

There is, of course, a precedent for such collective visits in the one made by some members of the I. A. E. to the States before the war, and in a similar visit of members of the S. A. E. to England and the continent. These were isolated efforts, whereas the suggestion now is that an elaboration of the idea should be a generally recognized procedure year by year.

September Sets High Mark in Production

Surpassed Same Month of Other Years—Total Output Estimated at 206,000

NEW YORK, Oct. 9—For the fifth consecutive time this year, monthly production records have been broken, September coming through with an estimated output of cars and trucks slightly in excess of 206,000. This sets the month apart as the best September in the production history of the industry, with the previous high mark of 185,000 in 1919 surpassed by a substantial margin. Compared with a year ago, production increased 31 per cent.

The showing is all the more remarkable taken in conjunction with the temporary closing of the Ford plants midway of the month. Ford's final figures are not expected to be more than 90,000, or 35 per cent less than August.

Ford Closing Affected Total

As was expected there was a falling off from the August total, due not so much to a seasonal decline in sales, although that element entered somewhat, as to the halt in Ford production and the fact that September, in addition to being a short month, was marked by a holiday. All of these factors were looked upon to bring the total down from the 272,000 level established in August.

The policy of manufacturers in shifting selling efforts from a section of the country where there appears to be a decline to a center where the demand holds strong is having the effect of keeping up sales in surprising volume. There is no indication now that the larger manufacturers are curtailing their schedules. In some instances they are opening the month on programs exceeding those of September.

Difficulty with Steel

The industry, however, is beginning to feel more acutely the results of the recent rail strike and is experiencing greater difficulty in getting through steel shipments from producing centers. Unless this situation improves materially it will have an adverse effect on automotive production for October and subsequent months of the year. This will prove of far greater detriment to sustained output than would any decline of sales that might come between now and the closing of the year.

Regardless of what may happen in the last quarter, however, 1922 will

Business in Brief

NEW YORK, Oct. 11—Trade and industry are feeling the lack of transportation, but despite this conditions are generally favorable. California is complaining of the lack of cars which imperils its grape crop. Lumber shipments west and south are delayed. The movement of coal is hampered. On the whole, however, there are not as many complaints over transportation congestion as might be expected.

Car loadings for the week were the largest reported in any week since Oct. 29, 1920. Soft coal production is estimated at 9,927,000 tons as against 9,702,000 the preceding week; anthracite is placed at 1,786,000 tons as against 1,856,000 the week before.

In textiles upward price tendencies and a steadily increasing volume of new business have been encouraging news. Raw wool seems to be improving in demand and the decline predicted following the passage of the tariff bill has not materialized.

Estimates on the corn crop are 2,769,000 to 2,805,000 bu.; spring wheat, 277,000,000 to 288,000,000; and oats, 1,255,000,000 to 1,265,000,000. Movement of grains is restricted by car shortages.

Prices have recovered in stocks and the volume of trading has increased. Trading in oil stocks has been unusually heavy. Money has been steady and bonds firmer.

Bank clearings aggregated \$7,781,864,000, a gain of 19.8 per cent over last week and of 15.2 per cent over this week last year.

August's preliminary report of revenues and expenses of 139 Class 1 railroads representing a total mileage of 176,953, shows gross operating revenues of \$382,711,637 against \$408,186,665 in the same month last year. Total operating expenses were \$316,356,411 against \$309,614,824. Net operating income totaled \$39,104,119 against \$70,027,867.

see a production of more than 2,000,000 cars and trucks. For the first nine months of the year a total of 1,873,000 has been reached.

Truck business continues to show steady improvement, a larger market developing for the heavy duty vehicles.

Parts Business Good

Parts business shows no signs of a let up, car makers continuing to order far ahead. Collections, in keeping with the general good condition in this branch of the industry, remain good.

May Employ Trucks for Steel Delivery

Manufacturers Begin to Feel Effects of Diversion of Railroad Facilities

DETROIT, Oct. 9—Under the rush of coal shipping to lake ports before the closing of navigation on the lakes and the diversion of rail equipment to the transportation of farm products from western states, service to automobile manufacturing companies in the Detroit district is approaching a point where it may be necessary to employ motor trucks for hauling material to keep factories operating.

The use of trucks up to this time has been limited to the hauling of material around congested transportation centers to points where it may be loaded for delivery either by rail or boat to Detroit. Steel is being hauled out of Pittsburgh by truck to railroad yards, where freight cars are available to avoid the delays experienced in getting cars in and out of the immediate Pittsburgh districts.

Rail shipments direct from Pittsburgh are requiring 10 days and upwards to make the normal three-day trip to Detroit. Steel at the mills in Pittsburgh is being held for days at a time, awaiting cars for loading. Steel from Ohio districts is being shipped by truck to lake ports for boat transportation to Detroit.

Delays Now Temporary

Embargoes by railroads in the eastern districts and in some sections of the Middle West and South are interfering with both deliveries and shipments to and from automobile factories. For the most part, however, these are intermittent and occasion only temporary delays. It has been necessary at several points to resort to trucks to haul material to points where rail service was still open, but factories are avoiding the additional truck costs by waiting wherever possible.

Production schedules are being interfered with somewhat by difficulty in obtaining material, and departments in some plants have been compelled to close for short periods, owing to holdups. There has been no cessation of operations in any plant, however, due to material shortages, and factories will go to any limits necessary to maintain production at a point required by sales.

Traffic and purchasing departments do not look for any relief from the rail difficulties until the coal requirements of the Northwest and other regions served by lake shipping are met. This is expected to require a month or more.

JORDAN GAIN 100 PER CENT

CLEVELAND, Oct. 9—The Jordan Motor Car Co.'s production figures for the first nine months of 1922 show an increase of considerably more than 100 per cent against the first nine months of 1921.

Willys May Take On Wilson's Old Duties

General Manager of Overland
Resigns Though Continuing a
Factor in Its Affairs

TOLEDO, Oct. 9.—The resignation of Charles B. Wilson as vice-president and general manager of the Willys-Overland Co., presumably to make way for President John N. Willys to take over those duties, has been accepted at a meeting of the board of directors.

While discontinuing his active association with the affairs of the company at a time when plans are being laid for a new fiscal year, Wilson will continue a factor in the Willys-Overland affairs, remaining a director in the Willys-Overland Co., president and director of the Willys-Morrow Co. of Elmira, N. Y., director of Willys-Overland, Inc., and president and director of the Wilson Foundry & Machine Co., Pontiac, Mich. The following statement was obtained from Wilson:—

Wilson's Statement

I had insisted upon the acceptance of my resignation as vice president and general manager of the Willys-Overland Co. for several reasons. In 1920 when I was urged by the management to assume the larger responsibility at Toledo it was with the dominating thought that I would ask to be relieved after the company had been re-established on a sound and satisfactory earning basis. I accepted, feeling that I had a great debt of gratitude to discharge to Mr. Willys personally and that the Wilson foundry had a great obligation on account of its relationship with Overland. Toledo is a fine city with wonderful possibilities but the early return to my home in Pontiac is of extreme importance to me as there are many things there to which my time should be devoted.

Overland has been re-established and has come through a period of gratifying earnings, \$4,283,000 net for June, July and August, thanks to a good organization and a product that is eminently satisfactory. My deep interest remains with Willys-Overland. There is no reason why the company should not continue a dominant factor in the automobile industry.

This is not the first time that Wilson has stepped into a breach in order to assist Willys. During the war Wilson left the Wilson Foundry & Machine Co. in order to take over the management of the Curtiss Aeroplane & Motor Corp. of Buffalo, which was one of Willys' properties. He remained there a year.

At the meeting at which the resignation was accepted, H. L. Thompson was elected chairman of the board and chairman of the executive committee.

GARDNER EXPORT AGENTS

ST. LOUIS, Oct. 9.—Gardner Motors Co. announces the rounding out of its export organization by the following appointments: Consolidated Motors, Ltd., Winnipeg, Ont.; National Auto Import Co., Mexico City; Robertson & Malcolm, Ltd., London; Sociedad Hispano Ameri-

Improved Truck Business That Will Come in 1923 Will Not Be Over-night Development

By O. D. COPPOCK

Sales Manager, Commerce Motor Truck Co.

Detroit, Oct. 9.

SALES of trucks aside from those in light delivery service and for bus work have been disappointing to those who looked for a late summer and fall boom, and as a result, the best the truck maker can anticipate with any surety is that a revival in general business in the spring will bring about a renewed need for trucks and new demand.

There has been fair business all year throughout the East and in the industrial sections of the Middle West, and this market should continue to absorb a sufficient number of trucks to keep factories operating on a basis that will permit them to break better than even.

Investigations in the farm districts indicate that the farmer will not do much better than clear up his old debts as a result of this year's crop. His buying of trucks will not do much more than absorb the stocks which have been hanging over in dealers' sales rooms and in storage for the past two years. With these cleared out the truck makers should be able to re-enter this market on a sizable scale in 1923.

Truck dealers as a general rule have become quite discouraged in the past two years and for the most part have given over their entire attention to the sale of cars. Until general business has begun to come into the market, dealers will be slow to stock up on trucks. The absence of stocks will present a problem which the factory must anticipate as truck-buyers are insistent upon immediate deliveries.

Dealers in larger cities who are handling trucks exclusively are doing practically all of the business at this time. Dealers handling cars and trucks together, as is the case in most cities of the country, are following the lines of least resistance and giving practically all of their attention to car sales. It is difficult to combat this situation until dealers find themselves warranted in placing men exclusively in truck sales work.

The ideal merchandising plan for the truck maker is to have an exclusive dealer and next to this a dealer who is handling several lines of trucks exclusively. Except in the larger cities, however, the exclusive truck dealer has not been successful and it has been necessary to combine the sale of the commercial vehicle with passenger car trading. Undoubtedly this system of merchandising will continue to be the general one and in normal times should be entirely successful from the factory viewpoint.

There is every reason to look forward to a good truck business in 1923 but it will not be an over-night development, and will only develop as general business throughout the country resumes its normal stride. The truck business has never approximated its possibilities and unlike the passenger car end, its period of greatest growth is still before it.

can Gastonoyge, Madrid; Rudolph Schmidt, Copenhagen; W. H. Carpenter, Sydney, Australia, and John Burns, Ltd., Christ Church, New Zealand.

Ford Now Producing New Four Door Sedan

DETROIT, Oct. 9.—The Ford Motor Co. is now in limited production of a four-door sedan which will sell at \$725 f.o.b. factory. The model is more commodious than the two-door sedan and is designed to meet a particular demand that Ford dealers have been experiencing. The two-door sedan will be continued as the large production vehicle of this type.

IOWA CONDITIONS BETTER

DES MOINES, IOWA, Oct. 7.—Considerable improvement in the sale of motor vehicles and equipment in Iowa, as compared with a year ago, is apparent. The farmers, however, are coming back rather slowly, and livestock is the principal source of surplus money.

Col. Havens Appointed Trustee for Locomobile

BRIDGEPORT, CONN., Oct. 7.—Col. Elmer H. Havens of this city, who, with Edmund S. Wolfe, local banker, has been acting as temporary receiver for the Locomobile Co. of America, the appointment being made by Judge Edwin S. Thomas in the United States District Court, was selected as trustee of the corporation, at the first meeting of the creditors here before Referee in Bankruptcy John Keogh. Bonds were fixed at \$100,000 and furnished.

Following his election as trustee, Col. Havens filed a petition with the referee for authority to sell the assets of the corporation, at a private sale, to the Durant interests. A hearing on the petition was scheduled for 10 o'clock the morning of the 16th before Referee Keogh. No objection to the petition is expected.

At the hearing Charles S. Canfield, Walter C. North and Gonner K. Birdseye, all of this city, were named as appraisers.

Templar Proceeding Under Receivership

President Bramley Says Appointment Is Constructive Step in Reorganization

CLEVELAND, Oct. 10—The Templar Motor Co. is now being operated under a receiver appointed by Federal Judge D. C. Westenhaver.

T. L. Hausman of this city, formerly an assistant of President M. F. Bramley, is the receiver under a \$50,000 bond.

The appointment was made on the application of the United States Axle Co. of Pottstown, Pa., which set forth in its statement that it has a claim of \$12,500 which is overdue.

The receiver, after being appointed, filed an application to borrow funds in the sum of \$5,000 to meet immediate needs, such as an accrued pay roll, etc. In the same application a request is made for authority to borrow an additional \$25,000 to be used as working capital in making up extra parts for dealers and Templar service stations and in finishing automobiles that are in process of manufacture. The receiver also has authority to carry on the Templar business.

Templar Company Agrees

In the suit the petitioner asks that the rights of creditors and the company be ascertained; that the court administer the property in the interest of both; that the receiver be authorized not only to carry on the manufacturing business but that he have the power to demand, sue and collect accounts and be given such other powers as are necessary.

The Templar company joined with the petitioner in the request for the appointment of a receiver. Bramley says that the receivership is a constructive step, which insures the court's protection while plans for the reorganization are being made.

The Standard Parts Co. of this city, which was harassed by the conflicts of opposing forces of stockholders in 1920, sought the appointment of a receiver and since then it has been doing well under the court's protection. That is what the Templar company wanted, judging from allegations in the bill of complaint filed by the axle company and the company's answer.

Assets Double Liabilities

Templar assets are placed at \$3,000,000 and the liabilities \$1,400,000. There are bills and notes long past due and the corporation has not on hand nor is able to secure sufficient funds at present to meet them, according to the petition.

If the assets of the company are preserved and properly handled, it is said, there will be more than sufficient to pay creditors and something will be realized by stockholders.

The Templar Motor Co. was organized in 1916. It has more than 22,000 stockholders and a plant here which has an annual capacity of more than 5000 cars.

A complete line of four cylinder cars is made.

For a long time the officers in charge of the management of the company have been engaged in a controversy with a group of stockholders. Efforts have been made before in the State courts to have a receiver appointed, but without avail.

Some time ago it was announced that \$750,000 had been deposited in a local bank to meet claims of creditors.

Barnum Succeeds Smith as President of Mercer

TRENTON, N. J., Oct. 7—A change in the personnel of the Mercer Motors Co. was made at a directors' meeting yesterday, by which R. W. Barnum was elected president, succeeding George P. Smith, who becomes chairman of the board. W. A. Smith, elected acting vice-president at a previous meeting, becomes the permanent vice-president and will continue as general sales manager. D. F. Fogg, formerly assistant secretary, has been elected secretary-treasurer. R. W. Barnum and W. A. Smith also have been elected directors.

Under the new order Barnum will look after production and finance, and W. A. Smith will handle sales. Barnum, for several years, has been at the head of the Mercer's body plant at New Haven, while Smith has been in the Mercer service for the past 12 years.

Interstate Chemical Acquires 5 Companies

NEW YORK, Oct. 11—A merger of chemical concerns has been perfected whereby the Miller Oil Products Corp. of Newark, manufacturer of all kinds of automobile dressing specialties, body dressing and lubricating oil; the Columbus Paint & Varnish Co., Norfolk Chemical Co., Lynn Ink Co., and the Boston Leather Dressing Co., have been taken over by the Interstate Chemical interests and will form the leather dressing division of the corporation. F. Alden Miller, of Miller Oil Products Corp., is general manager of this division.

The merger involved the transfer of stock of the Interstate to the amount of \$2,500,000 to the companies, taken over, in exchange for their stock.

Ford Des Moines Plant Opens at Full Capacity

DES MOINES, Oct. 6—The Ford Motor Co. of Des Moines was operating at full capacity yesterday, after approximately three weeks of idleness, forced upon it by orders from the main offices at Detroit.

The normal payroll of the plant is 1360 men, being divided as follows: Enclosed body department 700 men, model "T" department 400, and maintenance of building 260.

The daily output of the closed body department now is 125 sedans and 75 coupes.

Premier to Be Sold As Part of New Plan

Action Will Clear Property Title Preparatory to Reorganization of Company

INDIANAPOLIS, Oct. 7—The assets of the Premier Motor Corp. will be offered at private sale Nov. 14 or at public auction at the courthouse here at any date to be announced thereafter, according to a decree issued here by Judge Linn D. Hay in Superior Court.

As a result of a friendly receivership suit brought in June the Fletcher Savings & Trust Co. was appointed receiver July 1. The suit was brought on behalf of the American Foundry Co. At the time of the suit and the appointment of the receiver there was announced to the creditors a plan for re-organization that has been drawn up by a committee.

It was one purpose of this plan to have the assets of the concern offered at a judicial sale to clear the property title preparatory to re-organization and operation on a new basis.

Judge Hay's order was approved by the attorneys for the company and for the receiver. Bids on the property will be received until 3 o'clock in the afternoon of November 7. In the event of this private sale being unsuccessful the property will be offered later at public auction. Prior to the appointment of a receiver efforts to reorganize the company had been under way for several months.

State Insurance Move Fought by Companies

PHILADELPHIA, Oct. 10—At a meeting of the Underwriters Association of the Middle Department attended by nearly 200 representative insurance men and executives, a movement was launched to combat proposed legislation which would create a compulsory state automobile insurance fund and force all motor vehicle owners to purchase their insurance from the state.

While the movement is as yet local it is thought that it may spread to other states, as made evident by John T. Hutchinson, secretary of the Insurance Federation of America, coming here from Detroit to throw the weight of the national organization against the proposed legislation.

Hutchinson stated that it was a very serious matter for the insurance companies and declared that if this piece of legislation went through it would be the forerunner of others which would be the taking over of lines by the State.

U. P. C. OFFICE CHANGED

NEW YORK, Oct. 10—The Washington, D. C., office of the United Publishers Corp. has been moved to 26 Jackson Place, N. W. The former address was 816 15th Street.

Test Case Planned to Equalize Tariff

N. A. C. C. Will Endeavor to Remove Discrimination, As Provided by New Law

WASHINGTON, Oct. 7.—The first step in the elimination of discrimination by foreign countries against the American made automobile and truck was taken to-day when representatives of the industry met in conference with the United States Tariff Commission, placing before that body facts and figures showing what countries are discriminating against the American made passenger car and truck and the extent of this discrimination.

Under the provisions of the new tariff measure, the President, or the Tariff Commission, is given authority to retaliate against any country discriminating against American made products.

Finland at Fault

One of the cases cited before the commission concerns Finland's position. All automobiles imported from the United States are taxed 40 per cent ad valorem by that country, compared to a tax of 10 per cent if imported from France.

In cases of this kind the Tariff Commission is given authority to place a similar discriminatory tax on some commodity that is largely imported into America from that country. In the case of Finland, if the discrimination was not lowered to equal that of the French 10 per cent duty, or either the French raised to equal the 40 per cent duty on American automobiles, the commission would place a tax of 40 per cent on Finland's exports of lumber (this being her largest commodity exported to America).

Case Against Czechoslovakia

The powers of the commission, under the law, might be extended even further, as in the case of Czechoslovakia, which has placed an embargo against American made automobiles, while exempting entirely, without taxation, automobiles imported from Italy. In a case of this kind, the automobile industry will ask the Tariff Commission to place an embargo against some commodity that is exported to the United States from Czechoslovakia, which embargo would remain in effect until the discrimination against American made automobiles is eliminated.

A compilation of the existing tariff regulations shows that at the present time the following countries are discriminating against the American made automobile: France, with a duty of 45 per cent; United Kingdom, (passenger cars) duty of 33 1/3 per cent, trucks free; Italy, passenger cars and trucks, 35 per cent, plus 60 to 120 lire per 100 kilos; Canada, passenger cars and trucks, 35 per cent if from the United States, 30 per cent if from France, Belgium or Holland,

and 20 per cent if from Britain; Finland, 40 per cent if from the United States, 10 per cent if from France; Poland, 50 per cent; Esthonia, 20 per cent, Czechoslovakia, complete embargo, Italy free; Germany and Austria, complete embargo from all countries.

As a result of the conference with the tariff commissioners, it was suggested that in order to make a test case officials of the automotive industry file with the commission a concrete case, on which the commission would open up negotiations, through the State Department, with the country involved.

G. F. Bauer, secretary of the Foreign Trade Committee of the National Automobile Chamber of Commerce, who, with J. Walter Drake, chairman, represented the N. A. C. C. at the hearing, said:

Will Be Slow Process

Because of the fact that the whole situation must be worked out by the State Department, through diplomatic channels, we cannot, of course, accomplish results as quickly as we might like. Under the existing law, as embodied in the tariff law, just passed, the automobile industry is given ample protection, in the matter of being discriminated against, and it is the expectation of the Foreign Trade Committee of the chamber to press the matter as much as possible, in order that American automobile manufacturers may have a world-wide open market without discrimination.

All the American automobile manufacturer seeks is a fair field and no favors. He is entitled to receive a fair field, however, and it is the opinion of the majority members of the commission, I feel safe in saying, that discriminatory taxes as levied by some foreign countries are unfair and unjust to the automobile industry.

The Foreign Trade Committee will file its complaint for a test case as soon as it can be worked up, Bauer said, which will be probably within the next two weeks, in order that the machinery of the State Department may be set in motion toward the elimination of the discrimination. In all probability, the concrete case will be that of Czechoslovakia.

It is the plan to follow this case up, as soon as it is decided, with probably complaints against all other countries, filed with the commission at the same time.

Factory Service Heads to Convene in Chicago

NEW YORK, Oct. 10.—The N. A. C. C. has practically completed arrangements for the semi-annual convention of factory service managers. Tentative dates of Nov. 24 and 25 have been set, and the place selected is Chicago.

The first day of the convention will be given over to discussions and papers concerning factory service problems. The second day will be devoted entirely to the subject of service associations, a phase of service in which the Chamber has taken much interest. An invitation has been extended to all service and trade associations to send delegates. The detailed program will be completed in a week or two.

Process Gear Plant May Get Higher Bid

Court Delays Decision Allowing Further Offers for Factory Until Oct. 23

SYRACUSE, Oct. 11.—Federal Judge Cooper will receive additional bids for the New Process Gear Co. plant in this city at Albany, Oct. 23. When the sale of the property for \$1,904,000 to T. W. Warner of Toledo, vice-president of Durant Motors, Inc., came before Judge Cooper at Auburn for confirmation, two bidders who were not present at the sale here Sept. 6 posted bonds to make them eligible to bid.

At the special masters' sale the price offered by Warner was considered very low, but he was the only qualified bidder. Since that time confirmation of the sale has been twice delayed.

At Auburn, S. S. Mencken, an attorney of New York, posted a bond of \$50,000 and raised the bid price to \$1,905,000. It is believed he represented Charles A. Dana of New York, who is a controlling factor in the Spicer Manufacturing Co. of Plainfield, N. J. H. W. Williams of Baltimore also indicated a desire to bid for the assets.

Judge Cooper will announce his decision Oct. 23, but it is believed that the two bidders will be given an opportunity to raise the price before the sale is closed.

Covert Gear Suit

SYRACUSE, N. Y., Oct. 12.—The Covert Gear Co. of Lockport has obtained an order from Justice Cheney in Supreme Court to set aside a judgment of \$42,747 obtained by the New Process Gear Co. of this city. The Lockport company has set up a counterclaim for \$40,651. Both companies are in bankruptcy, but the debt incurred by the Covert company was contracted prior to the time its finances became involved.

HART-PARR CONFERENCE

CHARLES CITY, IOWA, Oct. 7.—The supervisory sales force of the Hart-Parr Co., tractor manufacturer, from all parts of the United States and Canada, has just completed its fall sales conference at the factory here. Plans were made for an extensive sales campaign.

It was stated that the sales and advertising campaign started last June had been successful and that on Oct. 1 the factory was behind with deliveries. A number of improvements are being made at the factory, the foundry and machine shop building receiving new tile fronts.

FRANKLIN SHIPMENTS GAIN

SYRACUSE, N. Y., Oct. 9.—September shipments from the factory of the Franklin Automobile Co. were double those of August and set up a mark almost 50 per cent higher than that reached during September of last year.

August Tire Output Increased Over July

Gain Also Shown in Shipments—
Inventories Take Drop from
Previous Month

NEW YORK, Oct. 6—Figures compiled by the Rubber Association of America, Inc., for the Department of Commerce show that during August there was an increase in production of pneumatic casings, inner tubes and solid tires over July.

This follows a decline in casing and tube production in July over June.

A comparative table of inventory production and shipments of casings, tubes and solid tires is as follows:

PNEUMATIC CASINGS

1921—	No. Mfrs. Reporting	Inven-tory	Produc-tion	Ship-ments
Jan. ...	45	5,319,605	703,430	965,417
Feb. ...	45	5,193,018	819,892	1,073,756
March ...	46	4,597,103	1,163,314	1,614,651
April ...	49	4,527,445	1,651,418	1,785,951
May ...	59	4,451,668	2,100,917	2,085,882
June ...	63	4,154,456	2,313,265	2,643,850
July ...	63	3,892,037	2,570,524	2,757,581
Aug. ...	66	3,934,853	3,043,187	2,894,442

1922—

Jan. ...	66	4,174,216	2,055,134	1,596,806
Feb. ...	66	4,691,329	2,084,308	1,562,365
March ...	63	5,183,286	2,645,790	2,073,963
April ...	65	5,464,336	2,401,187	2,086,651
May ...	65	5,523,095	2,721,503	2,639,273
June ...	64	5,042,147	2,838,890	3,133,260
July ...	63	4,834,106	2,476,636	2,695,095
Aug. ...	63	4,629,392	2,905,209	3,029,823

INNER TUBES

1921—	No. Mfrs. Reporting	Inven-tory	Produc-tion	Ship-ments
Jan. ...	47	5,586,163	740,824	1,042,617
Feb. ...	46	5,415,464	916,627	1,129,881
March ...	48	5,044,861	1,346,483	1,643,690
April ...	51	4,916,772	1,762,122	1,983,571
May ...	57	4,751,880	2,210,040	2,342,567
June ...	60	3,835,098	2,359,928	3,232,673
July ...	61	3,122,815	3,020,981	3,603,248
Aug. ...	64	3,649,319	4,430,152	3,804,060

1922—

Jan. ...	66	5,246,647	2,343,393	1,889,724
Feb. ...	65	6,141,956	2,596,774	1,702,583
March ...	63	6,991,118	3,017,511	2,090,737
April ...	65	7,250,096	2,650,573	2,329,343
May ...	65	7,189,552	2,970,696	2,938,947
June ...	64	6,186,534	3,130,629	3,973,679
July ...	63	5,675,839	3,068,199	3,630,744
Aug. ...	63	5,207,228	3,808,224	4,220,055

SOLID TIRES

1921—	No. Mfrs. Reporting	Inven-tory	Produc-tion	Ship-ments
Jan. ...	12	303,753	21,220	29,116
Feb. ...	12	304,374	23,365	29,599
April ...	12	269,985	28,859	42,080
March ...	12	283,800	28,710	43,926
May ...	12	264,663	35,156	40,122
June ...	11	240,336	28,395	49,867
July ...	11	220,003	35,123	55,678
Aug. ...	11	216,367	55,694	66,866

1922—

Jan. ...	11	181,769	40,224	33,294
Feb. ...	11	183,448	39,492	36,805
March ...	11	182,197	49,433	48,350
April ...	11	173,748	46,664	52,309
May ...	11	170,904	57,640	60,711
June ...	11	169,808	66,089	63,408
July ...	11	176,375	71,505	60,425
Aug. ...	11	216,367	55,694	66,866

"Production" and "Shipments" figures cover the entire month for which each report is made. "Inventory" is reported as of the last day of each month.

"Inventory" includes tires and tubes constituting domestic work in factory and in transit to, or at warehouses, branches (if any), or in possession of dealers on consignment basis, and as a total represents all tires

MODEL ROAD EXHIBIT FOR NEW YORK SHOW

NEW YORK, Oct. 7—In the cause of good roads the United States Government will make a display in the New York automobile show in January. This will be an art exhibit in place of last year's exhibit of different styles of roads.

There will be a landscape background, painted most artistically, while the exhibit itself will consist of miniature models of trucks and other motor transportation, road building machinery, etc. There will be a model road laid and the whole exhibit will occupy a space 21 x 17 feet.

The Government may have a motion picture display of road development.

and tubes still owned by manufacturers as a domestic stock.

"Shipments" includes only stock forwarded to a purchaser and does not include stock forwarded to a warehouse, branch, or on a consignment basis, or abroad.

Dayton Airplane Sued to Recover \$2,308,267

DAYTON, OHIO, Oct. 9—Suit has been filed in the United States District Court by the Federal Government against the Dayton Airplane Co., formerly known as the Dayton Wright Airplane Co., seeking to recover \$2,408,267 at 6 per cent interest from June 11, 1919, declared to have been fraudulently paid to the company by government officers. The government alleges that certain provisions in the contract entered into with the Dayton Airplane Co. by duly authorized officers were unlawful, fraudulent and void. During the progress of work under these contracts the Government claims it paid the company \$31,463,175.

Answering the suit H. E. Talbott, Jr., president of the company, asserts the war claims are based on technicalities or forced construction of contracts.

YOUNGSTOWN PLANT OPENS

YOUNGSTOWN, OHIO, Oct. 9—The tire department of the Republic Rubber Co., idle for two years, has begun production again on a part time basis. The company is in the hands of a receiver. The mechanical goods and inner tube departments here are working at capacity, while the tire department of the Canton plant is operating full time.

HAYWARD TIRE RECEIVERS

INDIANAPOLIS, Oct. 5—As a result of an action brought by local creditors, the Hayward Tire & Equipment Co. has been thrown into the hands of Victor L. Wright as receiver. The Hayward company has been a considerable factor in the manufacture and sale of vulcanizing outfits.

America Meets Tire Competition Abroad

Firestone, on Return Home, Says
Export Trade Should Increase Rapidly

AKRON, Oct. 11—The potentialities of foreign tire markets for American manufacturers are increasing and the American made tire rapidly is gaining in popularity in all foreign countries, according to Harvey Firestone, president of the Firestone Tire & Rubber Co., of Akron who has just returned from an extended survey of economic trade conditions in England, France, Belgium and Germany.

Firestone said:

American tire builders are successfully meeting the competition of European tire makers and are putting out a tire of superior quality in view of the price it is being sold for in Europe as compared to prices charged for European tires.

I look for our export tire market to increase rapidly provided American tire manufacturers take advantage of the opportunity afforded and increase the popularity of their tires in European markets.

Big Questions Need Settlement

Firestone states that his foreign survey causes him to believe that Europe never will settle down to serious work until some definite decision is reached and settlement made regarding Germany's war payments and France's international position.

He says in this connection:

However, despite the hampering effect of the social and political unrest in Europe, conditions are far better than when I was last abroad in 1920. England still is burdened with unemployment, although there is more optimism. Germany seems imbued with a desire to work and should make a speedy recovery when her leadership gets into the right hands. France's crops are going to be good this year and industrial conditions there are improving.

All Europe is very friendly toward the United States and it is a golden opportunity for American manufacturers to increase their export business by going after business in these countries.

Quick Assets of General Exceed Outstanding Stock

AKRON, OHIO, Oct. 11—After paying \$121,000 in dividends and \$100,000 on notes, the General Tire & Rubber Co. of Akron is able to show net quick assets in excess of the total amount of capital outstanding stock, and also to show a ratio of nearly 12 to 1 for current assets compared to current liabilities, according to the company's balance sheet for the first nine months of the current fiscal year. The balance sheet is for the nine months of the year ending Aug. 31.

Current assets are \$2,315,293 and current liabilities are \$215,363. Since the audit the company has paid off \$100,000 of its notes.

Three Societies See Ordnance Exhibition

Much of Equipment Shown Consisted of Guns on Self-Propelled Mounts

ABERDEEN, MD., Oct. 6—The fourth annual meeting of the Army Ordnance Association held here to-day in conjunction with the Society of Automotive Engineers and the American Society of Mechanical Engineers was a great success. Several hundred engineers were in attendance, but a relatively small number of these were from the automotive industry. The bulk of the equipment exhibited consisted of guns of all sizes from 16 in. down to the smaller types of machine guns, but many of the mounts for these guns are self-propelled and are, therefore, the product of automotive manufacturers.

Varied Program Given

The program included exhibition firing of guns of all sizes, the use of rifle phosphorus grenades, bomb dropping from airplanes, and manoeuvres of airplanes, a dirigible of the non-rigid type and of various tractors, tanks and trucks employed by the Army Ordnance Department. Some of the shells fired were equipped with super-sensitive fuses arranged to detonate on contact with a single layer of airplane fabric. In several cases tracer ammunition was used to enable the observers to follow the trajectory of the shell.

A number of tractors, several of which mounted guns or howitzers, were shown in operation. The speed with which these vehicles, many of them of several tons capacity, can travel seems extraordinary and has been materially increased since the war. A majority of tractors are of the track laying type. Of these a number have the track running over wheels with dual solid rubber tires. In these cases the track can be dismounted, thus permitting the vehicle to run on the wheels. The latter are intended primarily for use on paved roads where higher speeds are desirable and where the tracks, if used, would cause considerable damage.

Interest in Italian Tractor

There was considerable interest in the Italian Pavesi tractor, a wheeled type with drive to all four wheels from a two-cylinder opposed engine. This machine has a divided frame with a sort of universal connection between the front and rear sections. The pivot for this joint is a tube which runs lengthwise from end to end of the machine. By the use of this arrangement the tractor can negotiate exceedingly rough terrain and still keep all four wheels on the ground without frame distortion.

Among the tanks exhibited was a large machine known as Mark VIII. The turret on this machine has a double cylindrical wall in which are narrow vertical slots. One wall is so mounted as to

BUSES IN ONTARIO TO USE PNEUMATICS

TORONTO, ONT., Oct. 10—In the near future all motor buses operated in the Province of Ontario will be required to carry pneumatic tire equipment, according to Hon. F. C. Biggs, Minister of Highways. This step has been under consideration for some time.

There are two reasons for the decision. One is the government's statement that passengers are entitled to the greatest available comfort, and the other is that as the buses invariably travel at fairly high speed and frequently carry heavy loads, they should be so equipped as to permit of their operation with a minimum of damage to the roads.

Recommendations were made to the government that all commercial vehicles should be required to use pneumatic tires, but this is not considered practicable.

rotate about its vertical axis and is driven by an electric motor which keeps it in rotation, thus forming a stroboscope through which the operator can see in all directions. The slots are too narrow to permit the entry of machine gun bullets, so that the operator is protected, although afforded an exceptional range of vision. One of the smaller whippet tanks was equipped with a radio apparatus which permits the operator to receive instructions from a commander at a considerable distance.

Following the exhibit in the afternoon the program was completed by night firing with flashless and other forms of powder, some tracer ammunition being employed.

Quarter's Output Proved Biggest in Nash History

KENOSHA, WIS., Oct. 9—Last quarter's production of Nash automobiles was the largest of any quarter in the history of the Nash Motors Co., it was announced here by C. B. Voorhis, vice-president and director of sales. Indications are that the production this month will be the largest of any October, Voorhis said. The output is running between 192 and 200 sixes and fours daily.

Sales are continuing good, Voorhis said, with the farm districts buying in greater quantity than he had expected. The demand for closed models is increasing rapidly, and the company is doubling the capacity of its body plant in Milwaukee, where the closed bodies are made.

ERIE TRUCK RECEIVERSHIP

ERIE, PA., Oct. 8—On complaint filed by an Erie bank and other creditors, W. J. Stern has been appointed temporary receiver for the Erie Motor Truck Co. The indebtedness is placed at \$34,000.

Radio to Broadcast Car Buying Message

National Dealers' Association to Tell Fans on Oct. 12 How to Make Purchase

ST. LOUIS, Oct. 7—A radio broadcast from more than 100 stations throughout the United States on the night of Oct. 12 will be used by the National Automobile Dealers Association to tell radio fans who are also motorists, or prospective motorists, "How to Buy an Automobile." As this is a subject that engages the attention of 2,000,000 or so persons in this country every year, it is expected that considerable popular interest will be created in the radio world that night.

This will be the first time in the history of radio that practically every broadcasting station of any importance will carry to its listeners the same message at the same time. The public will be told in this talk just what the automobile industry is doing to make the ownership and operation of a motor car more pleasant and profitable, and what the factors are that should be borne most strongly in mind in determining the purchase of a new automobile.

Dealer Big Factor

Particular stress is laid in the address upon the importance of buying the right kind of car from the right kind of dealer. Especial attention is called to the intimate relation between dealer and owner in the matter of the proper maintenance of a vehicle and advising the public to consider carefully the time in which the dealer has been in business, his financial strength and his reputation for honesty and fair dealing with his customers and fellow dealers.

The address, which will be given by the broadcasting stations, was prepared by W. J. Brace of Kansas City, president of the N. A. D. A. and one of the oldest and most successful automobile distributors in the United States. Copies of this address were sent to more than 100 leading dealers in 100 cities after they had obtained permission from the broadcasting station for its use.

It is estimated that several hundred thousand persons, perhaps more than a million, will be reached by this method.

Chalmers Readjustment Plan Now in Operation

NEW YORK, Oct. 9—The Chalmers Motor Corp. readjustment plan has been declared operative. Note deposit certificates giving assent to the plan must be deposited with the Central Union Trust Co. on or before Nov. 9 in exchange for stock or cash to be delivered by the Maxwell Motor Corp. on or before Nov. 9. Extension of time to Nov. 6 has been given for deposit of additional notes with the New York Trust Co.

Makers Draw Space for National Shows

Seventy-six Members of N.A.C.C.
Given Assignments—Seven
Others to Exhibit

NEW YORK, Oct. 9—Seventy-six members of the National Automobile Chamber of Commerce were assigned space in the New York and Chicago national shows at the meeting of the manufacturers held Thursday. In addition seven other car concerns, not members of the chamber, were given the remaining spaces. These non-members consisted of Courier, Stanley, Noma, Hatfield, Rotary Six, Crawford and Climber.

As the space has been awarded, there are 79 car makers in each of the shows. Detroit electric, Sayers and Climber will not show at New York, while Noma, Hatfield and Rotary six will not be at Chicago. For the first time no foreign cars are booked for display.

The New York show will as usual be held in Grand Central Palace Jan. 6-13, while the Chicago show, Jan. 27-Feb. 3, will be held in the Coliseum, Annex and First Regiment Armory.

The following assignments of space were made:

New York Space	Car Name	Chicago Space
A-1	Vellie	F-5
A-29	Chalmers	E-4
A-18	Lexington	G-1
A-28	Gardner	H-1
B-27	Moon	B-1
B-26	Earl	G-2
B-28	Cole	H-2
B-29	Stephens	E-1
B-12	Auburn	J-1
B-24	Columbia	O-2
B-25	Stearns	P-1
B-8	Mitchell	O-1
B-30	Liberty	E-3
B-23	Kissell	F-2
B-2	Lafayette	B-1-Y
B-16	Westcott	Q-1
B-17	R & V	M-1
B-1	Locomobile	B-2-Y
B-3	Rickenbacker	B-8-Y
B-4	Stutz	M-2-Y
B-18	Case	B-2-Y
B-15	Apperson	K-4-Y
B-31	Elkhart	Q-2-Y
B-11	Elgin	N-1
B-14	Templar	B-3-Y
B-7	Davis	Q-3
B-10	National	A-1-Y
B-6	King	A-3-Y
B-9	Barley	B-4-Y
A-19	Buick	C-5
A-15	Studebaker	B-2
A-11	Dodge	D-1
A-20	Chevrolet	A-6
A-14	Willys-Overland	C-3
A-16	Cadillac	D-5
A-12	Nash	C-6
A-17	Hudson	D-3
A-13	Maxwell	D-2
A-26	Hupp	C-1
A-4	Packard	A-2
A-5	Durant	A-4
A-3	Paige	B-6
A-27	Olds	D-6
A-31	Franklin	B-4
A-22	Essex	D-4

AGRICULTURE HEAD NOW RIDES IN CAR

WASHINGTON, Oct. 8—Tradition, which constitutes a large part of official and commercial Washington, has broken a thirty-year record by the purchase of an automobile for the official use of the Secretary of Agriculture. Since the establishment of the department it has been an unbroken rule that the secretary and assistant secretaries shall use horse-drawn equipment.

Agriculture, it was figured, was always linked with the horse, and as a symbol of his office the Secretary of Agriculture has always ridden about Washington in a one or two horse-drawn vehicles. For years ten automobiles and one horse-drawn vehicle—all bearing the insignia of their respective federal departments—have stood about the Executive Mansion on cabinet days.

New York Space	Car Name	Chicago Space
A-30	Oakland	A-1
A-23	Reo	B-5
A-21	Chandler	C-2
A-32	Lincoln	B-3
A-7	Nordyke & Marmon	F-4
A-25	Haynes	C-4
A-10	Peerless	A-3
A-8	Jordan	K-1
A-6	Wills-Sainte Clair	E-2
A-2	Dort	A-5
A-24	Cleveland	F-3
A-9	Pierce-Arrow	F-1
B-13	Handley	B-7-Y
B-22	Mercer	A-8-Y
B-21	H. C. S.	B-6-Y
B-20	McFarlan	A-6-Y
B-19	Standard Steel	D-5-Y
C-3	Anderson	A-5-Y
C-15	Saxon	E-1-Y
....	Detroit Elec.	E-5-Y
C-19	Dorris	C-1-Y
C-5	Paterson	C-4-Y
C-4	Pilot	A-7
C-6	Milburn	E-6
C-12	Rauch & Lang	E-4-Y
C18	Premier	C-2-Y
....	Sayers	C-3-Y
C-16	Yellow Cab	C-6-Y
C-20	Kline	E-2-Y
C-21	Gray Motors	D-2
D-1 to 15	Star	D-1
C-14	Courier	E-3-Y
C-13	Stanley	E-2-Y
C-7	Noma	....
C-22	Hatfield	....
C-8	Rotary Six	....
C-11	Crawford	C-5-Y
....	Climber	Q-4

Note: In Chicago no letter after space means Coliseum or Annex; letter Y means Armory. In New York Show the A spaces are on first floor, B spaces on second, C on third and D on fourth.

"NASH TIMES" ISSUED

KENOSHA, WIS., Oct. 9—Nash Motors Co. has commenced the publication of a monthly house organ for its dealers, known as the *Nash Times*.

Law to Stop Thefts Outlined to N.A.C.C.

Provides for Bill of Sale and
Would Be Enacted in All
States of Union

NEW YORK, Oct. 9—The annual members meeting of the National Automobile Chamber of Commerce held last Thursday was well attended, but the fact that few of the heads of the companies were present testified to the prosperous condition of the industry. The railroad situation seems to be the most serious problem confronting the industry.

The meeting listened to reports on production, fall business, transportation difficulties and participated in an interesting discussion on the stolen car situation and pirate parts. The Motor Vehicle Conference Commission placed before the automobile manufacturers a rough draft of a universal law which, it is thought, would aid in stopping thievery. In brief this is a plan whereby a bill of sale would accompany each car and the sale duly recorded with the secretary of state. The car thus would be placed on record and could not be resold unless a record is made of the transfer, just as in a real estate transaction.

Makers Prepare for Driveaways

Speaking for the traffic department, Chairman W. E. Metzger said reports of general operating conditions continue unfavorable. With continued heavy production driveaways undoubtedly will be necessary, and manufacturers are organizing for them. Chairman Metzger reported that James S. Marvin, representing the Chamber, had been to Washington and had secured the co-operation of the Car Service Division of the American Railway Association.

Demand for closed cars, it was reported, is exceptionally good. In some of the northern states 75 per cent of the cars sold in September were closed jobs, whereas in the South it was as low as 15. The average was about 35 per cent.

The used car situation, it was reported, is a worse menace now than it was earlier in the year. Dealers appear to have lost sight of the fact that in the fall, when sales are lighter, they cannot allow the prices they do in the spring.

Washington Hears of Plan

WASHINGTON, Oct. 8—Ways and means of discouraging the exportation of stolen automobiles were taken up today by representatives of the automotive industry, officials of the automotive division of the Department of Commerce, and treasury officials, in charge of customs.

Under the plan placed before treasury officials this traffic in stolen automobiles that are exported, can be largely minimized. The plan proposed provides for a registration of all automobiles shipped out of the country.

Men of the Industry and What They Are Doing

British Publishers Here

R. Childs Bayley, representing Iliffe, Ltd., publisher of the Autocar, Automobile Engineer, Motor Transport, Motor Cycle and other English publications, and Roland Dangerfield of Temple Press, publisher of the Motor, are in attendance at the annual meeting of the Associated Business Papers, Inc., held in New York this week.

Sir Herbert Austin Arrives

Sir Herbert Austin, president of the Austin Motor Co., Ltd., of England, has just arrived in the United States. He expects to spend about a month here, studying American production and sales methods.

Sarver Represents Star

A. H. Sarver, former president of the Scripps-Booth Corp. of Michigan, has been appointed general manager of the Star Motor Co. of Michigan, which takes over the State distribution of that car. Sarver also is a director of the Durant Motor Co., Inc.

Strickland on Engineering Staff

William R. Strickland, recently connected with the General Motors Research Laboratories, has joined the engineering organization of the Cadillac Motor Car Co. as assistant chief engineer. Strickland has been actively connected with prominent concerns for a number of years as designer, engineer and chief engineer. He has served as chairman of the Cleveland section of the Society of Automotive Engineers and vice-chairman of the S. A. E. standards committee. At present he is chairman of its sectional committee on ball bearings. Strickland was trained in the Massachusetts Institute of Technology and later served as engineer in the United States Navy, Mare Island, Hawaii.

Peter Heldt Returns Home

Peter Heldt, engineering editor of AUTOMOTIVE INDUSTRIES has returned from a three-months' trip to Central Europe, which included a visit to Germany.

Martin with Fageol

Fred L. Martin, sales manager of the Sheldon Axle & Spring Co. since 1911, has resigned, effective Dec. 31. After that date he will devote his time to the sale of the Fageol Intercity Safety Coach, made by Fageol Motors Co., Oakland, Cal. He will act as eastern representative of the company with headquarters at Wilkes-Barre, Pa. Martin started with Sheldon prior to its making the worm gear type axle which is now its standard. Since 1911 the sales of the company have increased from \$20,-

000 a month to several hundred thousand dollars monthly, the increase being made up largely of worm gear axles. Martin's many years' experience in the parts field has brought him in contact with motor truck builders and furnished him with experience of much value in his new field.

Williams Succeeds Wilcox

Clarence F. Williams has been elected head of the Simplex Wire Wheel Co., Cadillac, Mich., in place of John P. Wilcox, who resigned on account of the pressure of other business. Wilcox will continue with the company as director.

Lord and James with Cadillac

Frank H. Lord, formerly of New York, and J. William James of Detroit have been added to the advertising department of the Cadillac Motor Car Co. Lord is a graduate of Princeton University and has a wide newspaper and automobile experience. James, who was formerly in the advertising department of Packard and who served with Detroit newspapers, is a graduate of Brown University. He joins the department as a copy writer.

Kelly Returns to Perfection

R. L. Kelly, who is well known throughout the southern states among replacement parts handlers, has made a new connection to represent the Perfection Spring Co. of Cleveland. Kelly has worked with the Perfection company previously, both in Cleveland and in the western territory, but he is better known through the South in connection with other lines. He succeeds P. A. Calkins, who has been promoted to assist the manager of the Perfection replacement spring business in its national distribution.

Bell to Sell Courier

L. A. Bell, Jr., formerly with the Lexington Motor Co. of Connersville, Ind., has joined the sales force of the Courier Motors Co. of Sandusky, and will travel in the South for Courier.

Murphy with Anderson

J. G. Murphy has been made factory manager of the Anderson Motor Co. at Rock Hill, S. C. Murphy was for some time assistant factory superintendent for the Pierce-Arrow Motor Car Co. and superintendent of Kelly Valve Co. of Chicago. He has assumed his new duties.

Findlater Taking Rest

James R. Findlater, vice-president and Pacific Coast manager of Earl Motors, has been compelled to take an indefinite leave of absence to secure a much-needed rest and regain his health, and has severed all connections with business activities.

Reinoehl in Own Business

H. K. Reinoehl has resigned as chief engineer of the Defiance Motor Truck Co. of Defiance, Ohio, remaining only as a director of that company. He has opened an engineering office under his own name, specializing in the design and development of automotive vehicles and their units.

Cadillac Appoints Lewis

William W. Lewis, after serving for five years as assistant general sales manager of an automobile manufacturing company, has been appointed central district manager for the Cadillac Motor Car Co. Previous to his work as assistant general sales manager, Lewis was identified for six years in field work, most of the time as district manager.

London Making Ready for November Exhibit

LONDON, Sept. 30 (*by mail*)—The Society of Motor Manufacturers and Traders is making plans for the 1922 motor car exhibition, to be held at the White City and Olympia, in London, Nov. 3 to 11, inclusive. Owing to the fact, it is said, that the general industrial situation of the country does not warrant a Commercial Motor Exhibition this year, manufacturers will concentrate upon the November display, and no efforts will be spared to make this exhibition the most interesting and comprehensive of any show so far held in the United Kingdom.

Prices will be lower, and in some cases will nearly approach the pre-war figures. Special attention will be given to the latest scientific developments toward eliminating weight and at the same time increasing the capacity and speed of the engine, increasing the comfort and smoothness of running, and reducing the consumption of gasoline and wear on the tires. Only those firms holding membership in the Society of Motor Manufacturers and Traders, which includes practically all representatives of American motor vehicles in the United Kingdom, are eligible to exhibit.

GARDEN FOR OVERFLOW

NEW YORK, Oct. 9—William Wellman, who has promoted several successful events in Madison Square Garden, is considering leasing the building for an overflow automobile show to be held at the same time the national show is being held in the Grand Central Palace. Wellman figures that there will be a number of manufacturers of passenger cars who cannot get space in the Palace and who will be glad of a chance to show in the Garden instead of at the various hotels. It is likely he will include trucks and tractors as well as parts and accessories.

Engineers Discuss Road Test Methods

Washington Section of S. A. E.
Hears Major Carlson of Bu-
reau of Standards

WASHINGTON, Oct. 9—At the first meeting of the Washington Section of the Society of Automotive Engineers this fall, Major R. E. Carlson of the Bureau of Standards presented a brief paper describing the road testing methods being followed in the comparative tests of fuels which the Bureau is conducting in conjunction with the Society of Automotive Engineers, the National Automobile Chamber of Commerce and the American Petroleum Institute. The method described by Carlson is the same one outlined in AUTOMOTIVE INDUSTRIES for Sept. 28, 1922.

Gasoline Basis of Test

It was pointed out in the discussion that the object of the speedway and other tests being made through co-operation of these organizations is primarily to determine which of the four grades of gasoline tested will enable the average car and truck to travel the greatest distance per barrel of crude oil refined. Other factors, such as ease of starting and dilution of lubricant by fuel, are not being overlooked, but are not being considered in the particular series of tests which Carlson described.

In reply to questions concerning the carburetor setting employed, Carlson stated that the setting used was that which had been found to enable the car to climb a given test hill in minimum time with throttle wide open, and was, therefore, a maximum power setting. It had, however, proved to be the leanest setting that could be used without missing when the throttle setting is suddenly opened wide in accelerating.

More Fuel Mileage Obtained

Although this setting had been found to correspond to a mixture of about 12 parts of air to one of gasoline (a condition which cannot give complete combustion) Carlson contended that it is about the leanest mixture which can be used in the 1920 model cars employed for the test, and still give satisfactory handling. Furthermore the mileage per gallon of fuel obtained is higher than is commonly secured with the cars in question.

Another speaker insisted that, even though the tests to date have shown with the equipment used, a better mileage performance than is common, it should not be concluded that a 12 to 1 or maximum power setting is the most economical, even though good accelerating conditions be required, particularly if a gradually opened throttle control is employed and the carburetor fitted is especially designed to handle the particular fuel in question.

In concluding the meeting a resolution to the effect that service men in and

United States Exports, Imports and Reimports of Automotive Products for August, 1922, and for Nine Months That Preceded

EXPORTS								
	Month of August				Nine Months Ending August			
	No.	Value	No.	Value	No.	Value	No.	Value
Automobiles, including chassis	2,618	\$2,699,380	7,409	\$5,137,894	27,176	\$32,740,801	49,759	\$38,186,905
Electric trucks and passenger cars .....	.....	.....	4	7,456	.....	.....	189	276,785
Motor trucks and buses, except electric...	381	434,052	.....	.....	5,473	8,232,959	.....	.....
Up to 1 ton.....	.....	.....	827	339,973	.....	.....	4,664	1,887,982
Over 1 and up to 2½ ton.....	.....	.....	369	335,235	.....	.....	1,589	2,029,343
Over 2½ ton.....	.....	.....	66	168,931	.....	.....	533	1,332,956
Total motor trucks and buses, except electric	381	434,052	1,262	884,139	5,473	8,232,959	6,786	5,250,281
PASSENGER CARS								
Passenger cars, except electric	2,237	2,265,328	.....	.....	21,703	24,507,842	.....	.....
Value up to \$800 .....	.....	.....	3,931	1,902,395	.....	.....	27,132	12,056,349
Value over \$800 and up to \$2,000 .....	.....	.....	2,026	1,849,226	.....	.....	14,280	15,461,994
Value over \$2,000 .....	.....	.....	186	534,678	.....	.....	1,372	4,141,496
Total passenger cars, except electric	2,237	2,265,328	6,133	4,286,299	21,703	24,507,842	42,784	32,659,839
PARTS, ETC.								
Parts, except engines and tires .....	.....	1,786,886	*11,866,136	2,678,941	.....	28,555,593	*104,865,304	25,183,496
Accessories, Parts of.....	.....	.....	.....	.....	.....	.....	.....	.....
Station and warehouse motor trucks..	19	23,393	12	10,766	287	278,190	116	118,872
Trailers .....	.....	.....	9	4,827	.....	.....	392	139,565
Airplanes	5	47,165	.....	.....	35	240,940	32	58,130
Parts of airplanes, except engines and tires .....	.....	15,005	*1,758	3,238	.....	128,578	*130,796	59,204
BICYCLES, ETC.								
Bicycles and Tricycles .....	.....	79,667	515	8,753	.....	1,304,892	6,070	85,784
Motorcycles	215	60,146	1,011	241,676	8,613	2,859,906	10,444	2,747,049
Parts, except tires	41	11,603	246	31,682	774	251,052	3,373	467,149
Gas engines.....	.....	.....	.....	.....	.....	.....	.....	.....
Traction engines (steam) except agricultural .....	.....	.....	4	17,520	65	98,340	25	50,831
Automobile engines	226	60,999	2,352	237,013	6,038	1,256,919	36,327	4,010,099
Aircraft engines.....	.....	.....	5	8,200	.....	.....	100	62,800
Complete tractors, except agricultural	2	7,930	14	30,249	5,092	5,611,804	60	100,861
Other internal combustion engines	272	24,573	528	120,010	6,160	1,347,022	3,243	519,806
IMPORTS								
Automobiles	40	57,206	33	62,944	330	601,406	243	470,156
Parts, except tires .....	.....	57,444	.....	44,895	.....	739,741	.....	435,820
All other.....	.....	15,246	.....	3,765	.....	111,845	.....	63,138
REIMPORTS								
Automobile (free of duty)	294	496,573	120	199,662	2,739	4,326,171	1,032	1,756,691
*Pounds.								

*Pounds.

about Washington should be invited to attend future meetings of the Section was unanimously adopted.

Buffalo Meeting

BUFFALO, Oct. 5—The theoretical considerations which are fundamental in securing light engines and chassis will be presented in a paper by Laurence H. Pomeroy before the S. A. E. Buffalo Section on Oct. 19. Pomeroy has special-

ized in the design of engines and cars employing aluminum alloys of light weight and great strength.

He will treat the conditions determining chassis weight in general as related to bearing sizes and the supports therefor. The extent to which the bearing load in engines is a function of inertia rather than excess pressure will be discussed. The paper will include con-

(Continued on next page)

Navy Airplane Wins First Detroit Event

Water and Air Cooled Engines Make Practically Duplicate Performances

DETROIT, Oct. 9.—Poor visibility and a slight rain caused the postponement of the first day's racing of the national airplane meet from Saturday until yesterday when the Curtiss Marine Trophy event for approximately 160 mi. was contested. This was won by Lt. A. W. Gordon in a navy TR-1 machine, equipped with a 220 hp. Lawrence J-1 engine which showed an average speed of 112.65 m.p.h. including the time passing through controls on the surface of the water. Gordon's speed in the air averaged 117 m.p.h.

Vought Second Place

Second place was awarded to the Vought VE-7H, piloted by Lt. H. A. Elliott and equipped with 220 hp. Wright E-3 engine. Lt. Elliott completed the race at an average speed of 109 m.p.h., his average air speed being 112 m.p.h.

Before the start of the race it was generally conceded that the two Curtiss 18-T triplanes, equipped with Curtiss D-12 400 hp. engines, stood the best chance of winning. The speeds made by these machines during the first few laps bore out this expectation, but Lt. L. H. Sanderson, pilot of No. 4, was forced down about a mile from the finish by lack of gasoline while Lt. R. Irvine, pilot of No. 5, was struck by a severe gust on one of the turns and forced to land. His machine was completely wrecked in this landing but he escaped without injury. Several minor troubles also prevented others from completing the race. Out of eight starting only two machines completed all laps.

Opportunity for Comparison

From the technical viewpoint, the most important feature of this race was the opportunity which it afforded to compare the aerodynamic efficiency of water cooled and air cooled engine installations with which the Navy TS and TR types were equipped. This comparison has never been made heretofore and it has always been a point of contention among engineers. It is, therefore, interesting to note that the TS-1, equipped with a 220 hp. air cooled engine, made practically the same performance as the TS-2, a duplicate machine excepting the engine installation which consisted of a water cooled engine of over 240 hp. the propellers being identical.

That this was not entirely chance is suggested by the performance of the TR-1, equipped with a 220 hp. air cooled engine, which bettered, by about two miles per hour, the performance of its twin, the TR-3, equipped with a water cooled engine of the same horsepower. While these comparisons indicate that the air cooled engine installation offers

SIXTEEN ARMY PLANES AND ONE CIVILIAN ENTERED IN RACE FOR PULITZER TROPHY

DETROIT, MICH., Oct. 10.—Final entries for the Pulitzer Trophy race which will be flown over Lake St. Clair Saturday include six U. S. Navy planes, 16 Army planes and one civilian aircraft. The entries are as follows:

Pilot	Plane	Motor
Lieut. D. Rittenhouse	BR-2 (Bee Line)	Wright H-3
Capt. F. P. Mulcahy	MB-7 (Thomas-Morse)	Wright H-3
Lieut. A. J. Williams, Jr.	CR-1 (Curtiss)	Curtiss CD-12
Lt. L. H. Sanderson	Navy X-1 (Wright)	Wright
Lt. S. W. Calloway (jg.)	BR-1 (Bee Line)	Wright H-3
Lt. H. J. Brow	CR-2 (Curtis)	Curtiss D-12
Lt. C. C. Moseley	Verville VCP-1 High Speed Pursuit	Packard
Lt. R. L. Maughan	Curtiss High Speed Pursuit	Curtiss CD-12
Lt. L. J. Maitland	Curtiss High Speed Pursuit	Curtiss CD-12
Lt. E. C. Whitehead	Loening High Speed Pursuit	Packard
Lt. L. D. Schulze	Loening High Speed Pursuit	Packard
Capt. F. O. D. Hunter	Thomas Morse High Speed Pursuit	Packard
Lt. C. L. Bissell	Thomas-Morse High Speed Pursuit	Packard
Lt. E. H. Barksdale	Sperry High Speed Pursuit	Wright H-2
Capt. St. Clair Streett	Sperry High Speed Pursuit	Wright H-2
Capt. Burt E. Skeel	Thomas-Morse MB-3	Wright H-2
Lt. B. K. McBride	Thomas-Morse MB-3	Wright H-2
Capt. H. M. Elmendorf	Thomas-Morse MB-3	Wright H-2
Lt. D. F. Stace	Thomas-Morse MB-3	Wright H-2
Capt. O. W. Broberg	Thomas-Morse MB-3	Wright H-2
Lt. J. D. Summers	Thomas-Morse MB-3	Wright H-2
Eddie Stinson	Dare Variable Camber Monoplane	Liberty
Lt. F. B. Johnson	Sperry High Speed	Wright H-2

less resistance than the water cooled engine installation with conventional types of radiators, they should not be regarded as absolutely final because of the inclusion in the figured speeds of the time in turns. This latter time is very dependent upon the skill of the pilot.

Chevrolet and Fisher Start Janesville Work

JANESVILLE, WIS., Oct. 9.—Following the visit of leading executives of the Chevrolet Motors Co. and the Fisher Body Corp. work has started on local plants for the two companies to cost about \$400,000. Fisher will erect a building 600 x 160, containing 96,000 sq. ft. of floor space which will permit of the construction of from 100 to 150 closed bodies daily and employ 700 men. It is hoped to finish this building by Jan. 1.

The new Chevrolet building will be one story, 500 x 125 and provide 62,500 sq. ft. of floor space. The cost will be \$100,000. This plant will be used for assembly of Chevrolet cars in addition to the present Samson assembly building. It will employ 500 men and 300 cars a day will be assembled.

WILSON TRACTOR ABSORBED

CHICAGO, Oct. 9.—The Wilson Tractor Manufacturing Co., Ottumwa, Iowa, has been absorbed in its entirety by the Austin-Western Road Machinery Co. of Chicago. The plant at Ottumwa will continue without change in the personnel, though officials at Chicago will appoint one in charge of the factory. Sales will be handled by the Chicago firm.

Engineers Discuss Road Test Methods

(Continued from page 744)

sideration underlying the design of forged aluminum connecting rods.

This meeting will be held in the rooms of the Engineering Society Club at the Iroquois Hotel, starting promptly at eight o'clock.

Detroit Meeting

DETROIT, Oct. 11.—Nine papers dealing with various production problems will be read at the production meeting of the S. A. E., to be held in Detroit, Oct. 26 and 27. Four papers will be read on the morning of the first day, and five papers the second. The afternoon of both days will be devoted to factory visits.

The papers are as follow: "The Group Bonus Plan and Its Application," by E. Karl Wennerlund, General Motors Corp.; "Cylinders from the Ore to Finished Part," by P. E. Haglund and I. B. Scofield, Ford River Rouge Plant; "Tool Allotment and Costs," by F. A. Mance, Studebaker Corp.; "New Methods of Processing Splined Shafts," by J. A. Ford, Studebaker Corp.; "Problems Met in the Production of Air-Cooled Engines," by William Dunk, Franklin Motor Car Co.; "Some Experiences from a Production Note Book," by H. J. Crain and J. Brodie, Packard Motor Car Co.; "Production Errors in Gears," by K. L. Herrmann, Studebaker Corp.; "Selection of Machine Tools," by A. J. Baker, Willys-Overland Co.; "Machine Tool Efficiency," by R. K. Mitchell, Maxwell Motor Car Co.

The production dinner will be held at the Hotel Statler on Thursday evening, Oct. 26. It will be informal. Pierre S. du Pont will be the speaker.

Ritchie Will Head Chicago Motor Bus

Leaves Fifth Avenue Coach to
Join Yellow Cab President
in New Venture

NEW YORK, Oct. 10—Following the taking over of the Chicago Motor Bus Co. by John Hertz, president of the Yellow Cab Manufacturing Co. of Chicago, and his associates, comes the announcement here of the resignation of John A. Ritchie as president of the Fifth Avenue Coach Co. of this city, to become head of the recent Hertz acquisition. Ritchie not only will direct the operation of the Chicago Motor Bus Co., but he also will be president of the American Motor Bus Co., which will manufacture the buses to be used in this service, which is to be greatly enlarged.

Ritchie will take with him another prominent official of the Fifth Avenue Coach Co.—Col. George A. Green, chief engineer, who will be vice-president of both the Chicago concerns.

Coupled with the announcement of Ritchie's change comes the additional information that Hertz has back of him in this new enterprise such prominent Chicago people as William Wrigley, Jr., Charles MacCullough, a Chicago banker, and representatives of the Armour and Swift families.

The new buses to be built will be of the general design of the Fifth Avenue coach, but of improved design and greater seating capacity. Double-decked Chicago buses seat 68 as compared with New York's 51.

Ritchie has been president of the Fifth Avenue Coach Co. since April, 1918, and his administration of the affairs of the big corporation has resulted in many improvements of the local service.

Complete Line of Durant Products Shown Together

DETROIT, Oct. 10—The first showing of Star cars in Detroit was made this week by the Star Motor Co. of Michigan, together with Durant fours and sixes, Locomobile and the Mason light truck, the event marking the first complete showing of Durant products anywhere. Notices issued by Durant officials calls attention to the record Durant has made in the assemblage of such a complete line in 18 months.

The Star headquarters in Detroit are on Grand Boulevard, two blocks west of General Motors Building and facing the Henry Ford hospital.

Plant Capacity Assured

NEW YORK, Oct. 9—Formal announcement is made by Durant Motors that capacity production for the next 15 months is assured for all Durant plants, the production schedule calling for more than 300,000 cars.

Most of this production will be Stars. Carroll Downes, president of Star Motors, Inc., stating that orders with deposits for 231,000 Stars for delivery within 15 months have been accepted. It is stated that orders for twice this number had been received.

As for the Durant car, the parent organization states that approximately 40,000 Durants, with a wholesale value of \$36,500,000, were built and marketed during the year of operation ending Oct. 1. Six of the Durant plants now are in operation and the one at Elizabeth will be in production this month.

In a notice to stockholders Durant Motors states that it "enters its second year of production with a substantial cash surplus, an exceptionally small plant investment for the volume of business contracted, and an unusually good prospect for continued profit making."

Expect Early Price Revision by British

WASHINGTON, Oct. 8—An early revision of prices, with several new engine designs and an inclination of the buying public for large automobiles, is predicted in a survey of the automobile market in England by the U. S. Consul at Birmingham and just received by the automotive division of the Department of Commerce.

The survey states:

Efforts are being made to check the development of American automobile sales in England. One of the methods being employed is a gradual decrease in production costs, which has been under way for some time, with a view of shortly revising automobile prices.

New prices will be announced by English automobile manufacturers within the next six weeks. It is expected that many of them will bring out new engine designs, showing considerable improvements, which will cause the cars to be relatively cheaper in spite of the fact that the new quotations may not be much below those in force at present.

Because of financial considerations, the present year has shown a good run on light passenger cars. A reaction, however, is forecasted in favor of higher powered cars due largely to a general reduction in car prices.

Elgin Price Reductions Range from \$50 to \$260

ARGO, ILL., Oct. 11—The Elgin Motor Car Co. announces reductions on all Elgin six models K1-1922 series. The new list is as follows:

	Old Price	New Price
5-passenger phaeton....	\$1,295	\$1,125
Standard scout.....	1,345	1,125
Special sport.....	1,425	1,165
Sedan	1,695	1,645

The peak list price of the standard phaeton was \$1,785, the new price being a reduction of \$660 from that figure. The peak price of the standard scout was \$1,895, the new price representing a reduction of \$770. The highest price yet quoted for the sedan was \$2,795, the new price being a reduction of \$1,150.

The special sport model has been produced only since April 1, 1922.

Surveying Electric Service Facilities

Association Sends Out Questionnaire to Authorized Agents
of Equipment Makers

DETROIT, Oct. 10—The Automotive Electric Service Association is making a complete survey of the extent and resources of this branch of the automotive industry as part of its campaign to place electrical service before the industry in its proper perspective. Questionnaires are being sent to all authorized service agents of all electrical equipment manufacturers from the offices of D. W. Burke, secretary of the association in Detroit, which will give the information regarded as necessary to promote the best interests of this service group.

The questionnaire lists the names of the electrical manufacturers represented, number of employees in each department and names of officers, the total investment in buildings, equipment, shop tools and fixtures, stock of parts and the gross volume of business in 1920, 1921 and 1922, approximately. The information in the individual questionnaires will be held in confidence, the summary of them all being the only feature which will be laid before the manufacturers.

Will Reach Car Makers

With the aid of these data it is proposed to present to electrical equipment makers, and through them the car makers, the general capacity for service of the association and to recommend that the electrical requirements of all car dealers throughout the country can be better met through the Electrical Service Association than through the service departments of the car maker. By making use of the facilities of the association members, it will be shown that stocks of electrical parts can be greatly reduced or dispensed with in the automobile factory or the car dealer's room.

Where dealers are equipped to do electrical service work, they can obtain their supplies as they need them from the association members, and where this equipment is not available, the association members will be prepared to both furnish parts and make necessary installations and repairs. The possibilities of this service will be especially urged as effective in smaller communities and in overcoming difficulties involved where car dealerships are subject to change.

Now Has 250 Members

The Automotive Electric Service Association now includes over 250 members and is rapidly gaining in strength. Practically all of the larger service agents are now included, and it is hoped to bring in hosts of others before the annual meeting in Chicago, Jan. 29 to 31, inclusive. This will be held in the Florentine room of the Congress and is during the week of the Chicago automobile show.

Daugherty Outlines Trade Body Attitude

Position Like Hoover's—Favors Government Agency for As- sociation Guidance

WASHINGTON, Oct. 10—There should be some Government agency for the guidance of trade associations before which the associations could submit their plans of operations and receive the Government verdict as to whether or not such proposed operations were legal or illegal under the anti-trust laws, according to a statement by Attorney General Daugherty. This expression by the attorney general is directly in line with the position of Secretary of Commerce Hoover on the subject.

More Liberal Attitude

Secretary Hoover has been of this opinion for months while Attorney General Daugherty appears to have assumed a much more liberal attitude than he maintained formerly. This is apparent from reference to the lengthy correspondence on trade associations exchanged about one year ago between these two cabinet members. At the time the attorney general's position was interpreted as being that the Government could give no definite assurances to trade associations and that the activities of the latter would be subject to investigation and prosecution at all times.

The attorney general said:

I am in favor of some plan that will prevent business being unduly disturbed, and some plan that will enable them to come and lay down their plans on the table, and let somebody in the government say that such plans do or do not conflict with the law, so that if they do not they can be gone ahead with without fear of indictment. Such a system would stabilize the situation and do away with the necessity for a lot of investigation and litigation. It would remove uncertainty and suspicion. There would be less sidestepping under it, and the general tendency would be to make parties interested more happy.

Justice Department Should Approve

The Department of Commerce should have jurisdiction in the trade association matter, Attorney General Daugherty said. He added that the approval of the Department of Justice should also be had. Trade associations would then have some security, he said. The necessity for the Government seeking injunctions against some alleged activities of trade associations would be done away with, it was pointed out.

The attorney general believes that some benefit has been derived by industry and trade associations as a result of the exchange of correspondence between himself and Secretary Hoover, in which it was indicated, to an extent, what trade associations can do without violating the law.

Mr. Daugherty thinks, however, that there is still room for improvement. The

Hardwood Lumber decision by the United States Supreme Court and other decisions have resulted in some clarification of the question as to how far a trade association can go, in the opinion of Mr. Daugherty.

Secretary Hoover is said to believe that open price associations' activities would be legal if the associations will announce prices for the benefit and information of public. Mr. Daugherty concedes that there is a possibility of co-operation between some associations and the Government in some respects, but he thinks the situation might be improved by certain additional legislation.

Federal Road Program 55 Per Cent Completed

WASHINGTON, Oct. 10—The Federal Government's seven year good road program is 55 per cent completed, according to a financial statement of the United States Bureau of Public Roads, showing the status of construction as of Aug. 31, 1922.

The figures show a total of 14,852 miles of Federal aid road completed and fully paid for; 14,670 miles more than half completed and 4456 miles completed, but not paid for in full. When the present projects are completed, which it is expected will be in 1923, the seven year program, begun in 1917, will comprise a total of 33,978 miles of entirely new highways throughout the United States.

For this net work of new roads, the Federal and State Governments will have paid \$590,000,000.

OLDS PROPORTIONS OUTPUT

DETROIT, Oct. 10—The Olds Motor Works, as a result of recent price reductions, reports business to be running in excess of production, and, as a result, is compelled to distribute its output on a proportionate basis among distributors. Demands for cars is reported to be especially brisk on the west coast, where good business is expected to develop as the resort season progresses. Two trainloads of cars will be shipped to the coast as soon as officials feel that this number can be allotted to any one section.

HARROUN BANKRUPT

DETROIT, Oct. 11—The Harroun Motor Car Co. of Wayne, Mich., has been adjudged bankrupt by Judge Little in the Federal Court. Although the creditors petitioned to have the concern declared bankrupt some years ago, court proceedings have been delayed until now because the directors believed that they could put the concern on its feet if granted time.

MONMOUTH ELECTS OFFICERS

MONMOUTH, ILL., Sept. 16—Stockholders of the Brown-Lynch-Scott Corp., formerly the Monmouth Plow Co., manufacturers of farm tractors and plow machines, have re-elected directors and officers.

Highway Conference Plans Make Headway

Three Days to Be Devoted to It— Industry Represented on Pro- gram and Committees

WASHINGTON, Oct. 11—The second National Conference on Highway Engineering and Highway Transport Education will be held in this city Oct. 26, 27 and 28, the morning sessions to open at 10 o'clock, afternoon sessions at 2 and night sessions at 8.

The morning session of the first day will be devoted to three subjects: (1) "The Relation of Adequate Highway Transport Facilities to National Progress," (2) "The Relation of Adequate Highway Transport Facilities to National Defense," (3) "The Highway Engineering and Highway Transport Fields and Their Need for Trained Men." The afternoon session will be given over to committee meetings. The evening session will include addresses on (1) "Relation of Research to Highway Engineering and Highway Transportation," (2) "The Trend of Highway Engineering and Highway Transportation Education."

Second Day Sessions

The morning and afternoon sessions of the second day will be devoted entirely to committee meetings. The evening session will be devoted to a symposium of highway educational problems of the future, comprising (1) Finance, (2) Engineering and Administration, (3) The Voice of the Road User, (4) Highway Regulation, (5) Correlation of Highway, Railroad and Waterway Transport, and (6) Transportation in Congested Districts.

On the third day the morning and afternoon sessions will be devoted to hearing the reports of the ten conference committees and the evening session will be in the nature of a dinner at 7.30.

Among those in the automotive industry who will serve as committeemen and speakers are:

Alvan Macauley, president, Packard Motor Car Co.; David Beecroft, directing editor, The Class Journal Co.; Windsor T. White, chairman of the board of the White Motor Co.; A. J. Brosseau, president, Mack Trucks, Inc.; E. M. Sternberg, vice-president and consulting engineer, the Sterling Motor Truck Co.; Robert A. Salmons, vice-president, Selden Truck Corp.; M. O. Eldridge, director of roads, A. A. A.; Charles A. Ward, president, Ward Motor Vehicle Co. and Roy D. Chapin, president, Hudson Motor Car Co.

ALBERT R. COUGHLIN DIES

DETROIT, Oct. 10—Albert R. Coughlin, who has been connected with the sales department of the Durant Motor Co. of Michigan since January, died Saturday after an illness of two months. Before joining Durant he was a special representative of the General Motors Export Co. and previously was assistant sales manager of the Dort Motor Co.

Kelly-Tire 6 Months Profits \$1,500,000

**Expected That Earnings for Last
Half Year Will Prove to
Be As Good**

NEW YORK, Oct. 9.—Net profits for the first six months of the year for the Kelly-Springfield Tire Co. are estimated to be in excess of \$1,500,000, equivalent to about \$2.15 a share on the 362,085 shares of \$25 par value common stock outstanding, after note interest and preferred dividend requirements for the period. It is expected that the showing of the last six months will be equally good, which will give \$4.30 a share for the full 12 months.

Actual amortization of the new Cumberland plant will begin next year. This plant cost about \$13,000,000 and was paid for principally through the sale of \$10,000,000 10 year 8 per cent notes. The trust agreement under which the notes were issued provides for the retirement of \$1,000,000 notes each year, beginning May 15, 1923, and continuing to May 15, 1931, when the remaining \$2,000,000 will be paid off at 110.

Preferred stock sinking funds provide for the annual retirement of 2 per cent of the 6 per cent preferred, of which there now is outstanding \$3,137,100 and 3 per cent of the 8 per cent preferred, of which there is outstanding \$5,625,000. Including preferred dividend requirements and note interest, the company will have to earn next year more than \$2,500,000 to show a surplus for common.

The company is producing more than 6000 casings a day. Akron is running at capacity, while Cumberland is operating full with the available force, finding it hard to get skilled tire builders. Eventually all operations will be concentrated at Cumberland.

The company's inventory position is good, no effort having been made to anticipate crude rubber or cotton requirements, the management buying at prevailing prices for current needs.

Rouge Plant Builds Most of Ford Bodies

DETROIT, Oct. 9.—The Ford Motor Co. now is building all of its bodies for models on which it has the heaviest production and sale at the River Rouge plant. With the termination of contracts with the O. J. Beaudette Co., Pontiac, Mich., which formerly built roadster bodies, the Rouge plant now is building 800 of these daily. The Beaudette plant recently has been taken over by the Fisher Body Co.

Phaeton bodies and the all-steel two door sedan bodies of the conventional Ford sedan also are being built at the River Rouge, exclusively. The phaeton body production has run as high as 3015 daily and averages about 2550. Sedan body production at the Rouge plant approximates 900 daily.

Bodies for the Ford coupe and for the new Ford four-door sedan are being made by the Briggs Manufacturing Co., these being the only bodies not built by the company itself. Production of these is lower than on the other models and rounds out the daily schedule of approximately 5000 cars daily which the Ford Motor Co. has been maintaining. Included in this total is the light truck production which runs from 400 to 500 daily.

BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

During last week developments having a direct bearing upon the local money market were not striking. Loans on call covered a range of 4 per cent to 5 per cent, the same as in the previous week. In time money rates there was little change; sixty and ninety days' maturities being quoted at 4½ per cent to 4¾ per cent, as in the previous week, while four, five and six months' maturities were quoted at 4¾ per cent, as compared with 4¾ to 5 per cent. The prime commercial rate remained unchanged at 4¾ per cent to 4½ per cent.

Car loadings for the week ending Sept. 23 totaled 973,291, the largest number for any week since Oct. 29, 1920. This amount exceeded the previous week by 27,372 and was 99,650 cars more than recorded for the corresponding week a year ago. Coal loadings were 187,896, the heaviest total since last March, and an increase of 17,740 cars over the corresponding week a year ago. The output of bituminous coal is still slightly below 10,000,000 tons per week. The failure to reach this mark is attributed to the warm weather and the shortage of coal cars for transportation.

Pig iron output for September was reported at 2,033,720 tons, or an average of 67,791 tons per day, as compared with a total output of 1,816,170 tons, and a daily average of 58,586 tons for August. September's output was nearly 24 per cent greater than that for last January and over twice the output for September, 1921.

September's total of 1469 commercial failures furnishes one of the evidences of general business improvement. This number was 12.3 per cent less than the amount for August, 46 per cent below the peak total for January and 9.2 per cent below the total for September a year ago. The amount of liabilities also shows a marked recession.

Total liabilities for September were \$31,920,466, 13 per cent less than in August, less than one-third of the liabilities for January, and 30 per cent less than those reported for September a year ago. The total amount of failures for the entire third quarter of 1922 were 4719, the smallest number for any three months since the second quarter of 1921, with liabilities of \$11,926,834, the lightest quarterly liabilities since the second quarter of 1920.

FINANCIAL NOTES

Hupp Motor Car Corp. has declared the regular quarterly dividend of 2½ per cent on common stock, payable Nov. 1 to stock of record Oct. 14. At the annual meeting of the corporation stockholders approved the retirement of 4000 shares of preferred stock acquired by purchase, 1921 shares of preferred stock acquired by conversion into common shares and 130,790 shares of common held in reserve for preferred stock conversion. The corporation's total capitalization now stands at \$6,100,000, consisting of 9079 shares of \$100 par preferred and 519,210 shares of \$10 par common.

Moon Motor Car Co. has declared a quarterly dividend of 25 cents on common stock, payable Nov. 1 to stock of record Oct. 16. It is reported that in the near future the annual dividend rate of \$1 will be increased or an extra disbursement made. Earnings for September are understood to have approximated \$400,000. Current earnings, after deductions for taxes and preferred dividends, are running at an annual rate of about \$9 a share on the 154,213 shares of common stock. It is expected that net profits for the entire year of 1922 will be in neighborhood of \$5 a share on the common.

Mack Trucks, Inc., will show net earnings for the third quarter, after charges and taxes, of \$1,315,633, or \$3.64 a share on the 283,108 shares of no par common stock, after preferred dividend requirements. This is not far below the second quarter's net profits. Earnings fell short of preferred dividend requirements in the first quarter. Indications are for this quarter that profits should approach \$3 per share, making more than \$9 a share for the year. Current production is slightly over 500 trucks a month.

Duesenberg Auto & Motors Corp. securities may now be sold in Massachusetts as the order prohibiting the sale has been revoked by the Massachusetts Department of Public Utilities. The sale of securities by the state was barred by the authorities because the company failed to file certain required information which since that time has been submitted.

Yellow Cab Manufacturing Co. shows net earnings this quarter almost equal to the entire first half of the year. Since Jan. 1 4500 cabs have been turned out. Orders are on hand for 1300 cabs for delivery in the next two months, which will necessitate increasing factory operations.

Fisher Body Corp. has declared the usual quarterly dividends of \$2.50 on the common and 1¾ per cent on preferred stock, both payable Nov. 1 to stock of record Oct. 21.

Allis-Chalmers Manufacturing Co. has declared the usual quarterly dividend of 1 per cent on the common stock, payable Nov. 15 to holders of record Oct. 24.

Mullins Body Corp. has declared the regular quarterly dividend of \$2 a share on the preferred stock, payable Nov. 1 to holders of record Oct. 16.

Kelsey Wheel Co. has declared the regular quarterly dividend of \$1.75 a share on the preferred stock, payable Nov. 1 to holders of record Oct. 20.

Willys-Overland Co. net earnings for the months June, July and August amounted to \$1,283,000.

Railroads May Use Trucks as Feeders

California Likely to Adopt Them If Individual Operation Is Unsatisfactory

LOS ANGELES, Oct. 9.—W. R. Williams, examiner of the State Railroad Commission, is authority for the statement that the railroads in California are planning to augment their service with the use of motor trucks. He has said that it is the intention of the railroads to use trucks as feeders to their lines, even to the extent of curb-to-curb delivery.

He has told the motor carriers now in the business that it is up to them to provide adequate equipment and develop their service, because records are being made of complaints, and it is understood that if shippers protest against unsatisfactory service the railroads will assume it.

Motor freight and passenger carriers in California that operate between fixed termini are required to have certificates. In fact, the only difference between them and the railroads is that the railroad commission can take their certificate away from them while it cannot stop railroads from operating.

Highway Opposition Enters

Some opposition to the use of the highway by certified carriers has developed in this state recently, but is not likely to gain much headway. The claim is made that the highways have been built as an investment by the public and that it, therefore, is not conducive to public welfare when a railroad commission grants to certain parties operating rights over the highways and denies them to others.

The commission claims it functions chiefly for the protection of shippers and unless their control were exercised the public would be in the hands of irresponsible and unprincipled operators. The Supreme Court of the state has sustained the commission in its right of control.

Service Association Sees Automotive Films

NEW YORK, Oct. 10.—The October meeting of the Automotive Service Association of New York was held in the large auditorium of the Automobile Club of America with over one hundred members in attendance. It was one of the largest meetings in the history of the organization.

The Paige-Detroit dealer film and the "Shop Profits" film of the Automotive Equipment Association were shown, the latter film having the Black & Decker addition. J. Howard Pile, Technical Editor of MOTOR WORLD, gave a short talk on the subject of shop profits to introduce the film.

After the pictures were shown, short addresses were made by Alfred Reeves,

general manager of the National Automobile Chamber of Commerce; G. W. Brogan of the Black & Decker Manufacturing Co., Ralph C. Rognon and J. Willard Lord.

INDUSTRIAL NOTES

Rivett Lathe & Grinder Co., Boston, has moved its Detroit sales office to 6526 Cass Avenue. The office is operated in conjunction with that of Reed-Prentice Co., Becker Milling Machine Co. and Whitcomb Blaisdell Machine Co., under the management of T. C. McDonald. The new quarters provide ample space for the exhibition of sample machines. The sales force has been augmented by the addition of E. B. Barber, formerly superintendent of the Lafayette Motor Co. plants.

Traylor Engineering & Manufacturing Co. has made an enlargement in its plant in Allentown, Pa., and will consolidate its truck and Hiflex spring business there. The truck business hereafter will be conducted under one consolidated management at Allentown, the Cornwells plant being used temporarily as a storage and supply station from which deliveries will be made. The Cornwells plant consists of 100 acres of land, with buildings, 200,000 sq. ft. in area.

United States Asbestos Co. has moved its general offices from Lancaster, Pa., to the plant at Manheim, Pa. Pending the erection of an office building, the executives are housed in temporary quarters.

Paul Rubber Co., Salisbury, N. C., has equipped a new factory to build 5000 tubes a day. This is the second new tube plant built by this company since last year.

Willys-Knight Phaeton Added; Listed at \$1,435

TOLEDO, Oct. 9.—Another seven passenger model has been added to the Willys-Knight line, this being a phaeton. This follows closely on the heels of the seven passenger sedan announcement. The phaeton, like the sedan, is known as Model 27, and its chassis characteristics are similar to the five passenger, but the wheelbase is 6 in. longer. The tonneau is roomy and the auxiliary seats unfold from a closed compartment in the rear of the driving seats. The price is \$1,435.

Sport Roadster Added to Oldsmobile Models

LANSING, Oct. 11.—A sport roadster, mounted on the light eight chassis, has been added to the 1923 Oldsmobile models. The price is \$1,625. The body is finished in green with nickel trimmings and vertical nickel rails on the rear deck.

The equipment includes disk wheels, cowl lights, cowl ventilator, windshield wings, spotlight mounted under the left front headlamp, aluminum steps, stop and parking lamp, cigar lighter, bumpers, windshield visor, double tire carrier and a nickel windshield wiper. A new feature is the carrier for a golf bag which is mounted on the right step.

METAL MARKETS

Transportation difficulties serve to keep the minds of both producers and consumers on the fulfillment of old steel contracts to the exclusion of fresh transactions. Steel producers, especially sheet rollers, encounter no less trouble in keeping themselves supplied with raw material than in preventing the accumulation of finished material at their plants. A recent order of the Interstate Commerce Commission restricting the use of open-top cars to the coal movement has made it doubly hard for sheet mills to keep themselves supplied with sheet bars, which, being 30 ft. long, can not be hauled in side-door box cars.

The supply of flat cars is virtually nil. Cutting of sheet bars for hauling purposes entails considerable waste. Some of the sheet mills are having recourse to motor trucks. Automotive sheet consumers are exerting every possible pressure upon mills in order to obtain more satisfactory shipments, but consumers recognize the tough job that rollers face, and while they plead and urge they are, for all that, considerate. As the result of these obstacles to production and to the flow of sheets into consumers' plants the market situation continues oblique. Most of the sheet rollers are carrying enough old orders into the fourth quarter to keep their mills in comfortable operation until the middle or even the end of next month.

Chicago sheet producers even assert that they have nothing to sell for this year's delivery. This abundance of unfilled tonnage is in a large measure, however, the result of underproduction in September, and can in no wise be attributed to fresh demand. It is only natural that with the difficulties which sheet consumers encounter in obtaining prompt shipments of material ordered long ago premiums on early deliveries should continue with somewhat more tenacity than in most other steel products. The fact, however, remains that premiums are slowly but gradually vanishing in the entire steel market. Precious little fresh sheet business has come onto the market this month.

Pig Iron.—Automotive foundries are buying gingerly, the impression of a gradual easing off in prices being general among consumers. Embargoes have been lifted, but car shortage continues to operate against a more free movement of pig iron.

Aluminum.—The domestic producer has let it be understood that while prices average 1c. to 2c. per lb. higher than they did early in September, every inquiry and order is being judged on its own merits and prices quoted on one tonnage do not necessarily apply to another because specifications and conditions surrounding delivery, etc., may differ. In pre-war years there was always a base price which was looked upon as the nominal contract price of the domestic producer. Eventually this condition will return. For the time being reserve on the domestic producer's part with reference to price publicity is not only natural but justified. Large tonnages of imported aluminum are in the hands of semi-speculative interests who would be the real beneficiaries of "official" prices such as prevail in the lead market. There always was and probably always will be an "outside" aluminum market, and the domestic producer has always tacitly recognized this condition.

Copper.—Quiet, on a 14c. basis with no interest in deferred positions.

Calendar

SHOWS

- Oct. 7-14—New York, Electrical and Industrial Exposition, Grand Central Palace.
- Oct. 21-28—Washington, D. C., Annual Closed Car Salon, Convention Hall, under the auspices of the Washington Automotive Trade Association.
- Nov. 13-18—Chicago, Annual Show and Meeting of the Automotive Equipment Association.
- Dec. 3-9—New York, Eighteenth Annual Automobile Salon, Commodore Hotel.
- Jan. 6-13—New York, National Automobile Show, Grand Central Palace, under auspices of National Automobile Chamber of Commerce.
- Jan. 8-13—New York, Body Builders Show, Twelfth

Regiment Armory, under the auspices of the Automobile Body Builders Association.

- Jan. 27-Feb. 3—Chicago, Annual Automobile Salon.
- Jan. 27-Feb. 3—Chicago, National Automobile Show, under auspices of National Automobile Chamber of Commerce, Coliseum and First Regiment Armory.

FOREIGN SHOWS

- Oct. 4-15—Paris, Automobile Show, Grand Palais.
- Nov. 3-11—London (Olympia), Automobile Show.
- Nov. 9-19—Buenos Aires, Argentina, Annual Exhibition, Automovil Club Argentino.
- Nov. 29-Dec. 4—London (Olympia), Cycle and Motor-

cycle Show. British Cycle Motors, The Tower, Warwick Road, Coventry.

- Dec. 15-Jan. 2—Paris, Aeronautical Salon, Grand Palais. Chambre Syndicale des Industries Aeronautiques, 9 Rue Anatole de la Forge.

- Jan. 13-24—Brussels, Sixteenth International Automobile and Cycle Exposition, Palais du Conquanteinaire.

- May - July, 1923—Gothenburg, Sweden, International Automobile Exhibition. Sponsored by the Royal Automobile Club of Sweden.

CONVENTIONS

- Oct. 7-14—Detroit, Second National Aero Congress and National Airplane Races.

- Oct. 18-20—Chicago, National Association of Farm Equipment Manufacturers, Congress Hotel.

- Oct. 26-28—Washington, Second National Conference for the Study of Highway Engineering and Highway Transport Education.

- Nov. 24-25—Chicago, Semi-Annual Convention, Factory Service Managers, National Automobile Chamber of Commerce.

- Jan. 29-31—Chicago, Annual Meeting, Automobile Electric Association, Congress Hotel.

S. A. E. MEETINGS

- Oct. 26-27—Detroit, General Motors Building.
- Jan. 9-12—New York, Annual Meeting.

Tractor Profitable, Farm Survey Shows

WASHINGTON, Oct. 7—Is the tractor more serviceable, the year around, than horse-drawn power on the farm? This question, more or less a mooted one, has been made the subject of a study by the Department of Agriculture, who to-day announced their findings, based on a survey of southern farms. In announcing the results, the department makes it clear that the survey covers conditions in the South and is not construed as applicable to the entire farming industry of the United States.

Eighty-six per cent of the farmer owners interviewed stated that their tractors were proving profitable, in comparison to horse-drawn equipment. Ninety-six per cent of them declared that they intended to use them the following season, as did also 52 per cent of those who did not believe they were profitable.

Canvass Made in 1918

The canvass, which was made in the spring of 1921, included 684 tractor owners in Alabama, Georgia, North and South Carolina and Tennessee, all of whom had bought their tractors new between March, 1918, and September, 1920.

In order that farmers may take advantage of the survey, the department has issued a Farmers' Bulletin No. 1278, entitled "Tractors on Southern Farms," showing in detail the department's findings. The experience of present owners is summarized with reference to the advantages and disadvantages in their use, the sizes now used on farms of varying acreage and the sizes they believe would be the most suitable for their condition, estimates of the probable life of their tractors, cost of operation, etc.

RIM ARTICLES FILED

BRIDGEPORT, CONN., Oct. 7—With headquarters in Hartford and with the object of promoting the interests of the

automotive industry relative to tires, rims, wheels and the like, as well as providing an inspection service for manufacturers of rims, the Tire and Rim Association of America, Inc., has been incorporated.

Articles of incorporation have been filed at Hartford. Subscribers to the stock are: Frank A. Scott, receiver Standard Parts Co.; George C. Brainard, vice-president and general manager of the Hydraulic Steel Co.; and P. W. Litchfield, vice-president of the Good-year Tire & Rubber Co.

Raybestos Co. Reports Increase in Business

BRIDGEPORT, CONN., Oct. 9—A 40 per cent increase in sales during the first part of the year over the corresponding period of last year, with prospects bright for a still greater increase, is reported by M. F. Judd, sales manager of the Raybestos Co.

The increase in sales is bringing sales closer to the business of 1919, which was the best in the company's history. Production during the period covered, according to the reports, shows a total of between 5,500,000 and 6,000,000 feet of brake lining.

Better Prospects Appear in Alabama Farm Section

BIRMINGHAM, ALA., Oct. 11—Prospects for the sale of automobiles in the country districts of Alabama are looking better every day. Farmers are paying debts that they have owed for the last three years, according to F. O. Hooten, supervisor of the bureau of markets of the state department of agriculture, who recently made a trip through the central section of the state.

This tendency to liquidate debts of long standing is noted throughout the South.

In Chattanooga the bankers are reporting that payrolls which have been way down, are now near normal.

Custom Officers Told of Reimportation Tax

WASHINGTON, Oct. 9—Assistant Secretary of the Treasury Elliott Wadsworth has notified collectors and other officers of the customs service of a treasury decision relating to the re-importation of American automobiles and trucks sold to the American Expeditionary Forces or allied governments for war purposes. Amendment of articles 334 and 337 of the customs regulations of 1915 is in accordance with the new tariff law which contained a provision imposing a duty of 90 per cent ad valorem on re-imported trucks and other vehicles.

Reading of Amendment

The amendment relating to automobiles and trucks is as follows:

Attention is invited to the provision of paragraph 1514 of the tariff act of Sept. 21, 1922, which restricts the free entry of American goods exported and returned without having been advanced in value or improved in condition to such articles as are imported by or for the account of the exporter thereof.

Articles 334 and 337 of the customs regulations of 1915 are hereby amended so as to extend the requirements heretofore applicable only to the identification of domestic bags to merchandise of every description, claims to be free of duty under this provision of paragraph 1514. Merchandise of American manufacture or production reimported by or for the account of any person other than the exporter thereof will be assessed with duty at the same rate as though of foreign production.

Must Ascertain Facts

Before permitting the release of automobiles or parts of the same which are returned by any person other than the exporter thereof, collectors should ascertain whether such shipments fall within the provisions of section 322 of the said act. If imported after having been sold to any foreign government, individual, partnership, corporation or association, shipments of the character described in this section should be assessed with duty at the rate of 90 per cent ad valorem on the basis of the American selling price as defined in section 402 (F) at the time of exportation of the merchandise from the United States.